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Skeptical Inquirer

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A SKEPTICAL LOOK AT 'OVERNIGHT'

AMNESIA

Power Lines and Cancer, Distant Healing and Health Care

The Numerology of 23

Slaying the Vampire: Solving the *Chupacabra* Mystery

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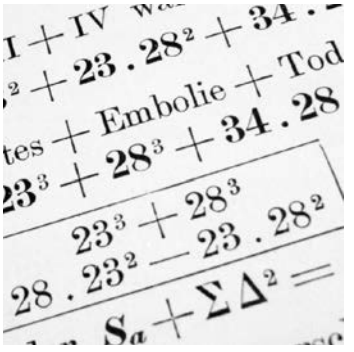

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[FROM THE EDITOR

Pop Culture and Questionable Cases

We are immersed in popular culture. The influences of Hollywood entertainment on what we think, say, believe, and do can seep deeply into our beings. Sometimes, without our even realizing it, this influence can distort our view of the real world. We have two examples in this issue. Both, curiously, involve memory.

The first is our cover article, "A Skeptical Look at a Remarkable Case Report of 'Overnight' Amnesia." Neuroscientists and psychologists Harald Merckelbach, Thomas Merten, and our colleague Scott O. Lilienfeld critically examine a study about a supposed new memory disorder published last year in a journal of neuropsychology. After a car accident in 2005, a fifty-one-year-old woman seemingly loses her memories of each day's events overnight. Every day is new to her; her short-term memory is wiped clean only to be filled up the next day and then be lost again that night. The study has gained attention, but too little has been skeptical. Our authors rectify that situation and find major limitations to the report about her case: it lacks crucial background information (how does she carry on her job if she forgets everything from the day before?), fails to exclude feigning or lack of motivation to remember new material, and lacks "connectivity" to the scientific literature (something often under-appreciated)—how exactly would memory be acquired during the day and then wiped out each night? There is no known mechanism for doing that.

These deficiencies of the study lead our authors to suspect that the woman has been strongly influenced by a fictional case depicted in a widely seen Hollywood movie, *50 First Dates*, starring Drew Barrymore. The woman saw that movie several times after her accident. The authors of the original study noted that possibility but then dismissed it. Our authors do not. Occam's razor leads them to suggest the study doesn't demonstrate amnesia at all but a kind of simulation of it based on the woman's (mis)understandings of amnesia after seeing the movie. Something similar has happened before. After the airing of the 1976 television film *Sybil*, which portrayed a woman with supposedly sixteen distinct personalities, the number of such dissociative personality disorder cases "skyrocketed into the thousands."

Our authors draw several lessons from this case; one is that widely viewed television programs and films may influence how patients present or describe their own symptoms. The case reminds us, say Merckelbach, Merten, and Lilienfeld, "that in today's media-driven world, some disorders may be what we term telegenic in origin: induced at least partly by television, films, and news and entertainment media."

A second case is reported in this issue by our deputy editor, Ben Radford. He draws on research for a book he has just published on the supposed blood-sucking chupacabra creature, which suddenly appeared on the scene in 1995. Radford shows that the first sighting of a chupacabra came shortly after the woman who reported it saw a sci-fi horror movie, *Species*, featuring a creature that bears an uncanny resemblance (twelve morphological similarities, in fact) to her subsequently reported chupacabra. Radford, who flew to Puerto Rico to interview the woman, is convinced that she sincerely believes what she reported. But he is equally sure this movie is what started the chupacabra myth.

Our minds are a wonder. They have grand capacities for creativity. Sometimes, influenced by the pop culture all around us, they create things we then think are real. It's a fascinating, and sobering, set of lessons.

—Kendrick Frazier

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When Entertainment Meets Science: Summit Boosts Innovative Education

James Underdown

Can the entertainment media, with their formidable skills, help educate young people about science? That was just one of the hopes as the National Academy of Sciences (NAS) hosted the unusual Summit on Science, Entertainment, and Education at the Paley Center for Media in Beverly Hills, California, on February 4, 2011.

The all-day symposium featured a top-shelf lineup of speakers from all over the United States on the status and direction of science education today. Each of its three categories (science, entertainment, and education) was well represented by innovators in their respective fields with relevant knowledge and experience.

From the world of science, luminaries such as Ralph Cicerone, NAS president; Sean B. Carroll, biologist; and Charles Vest, president of the National Academy of Engineering and president emeritus of the Massachusetts Institute of Technology, were present. All of the participants in the science section of the symposium, including Neil DeGrasse Tyson and superstring theoretical physicist and author Brian Greene, recognized the need for scientists to be able to communicate both ideas and enthusiasm to the general public.

The Walt Disney Company's Lizabeth Fogel and Tony DeRose from Pixar Animation Studios joined event co-sponsor Jerry Zucker to give a much-needed Hollywood perspective. All were hopeful about entertainment's role in future science education while mindful that both the television and movie industries are for-profit businesses. It was encouraging to hear that both Disney and Pixar are making conscious efforts to educate in new and creative ways.

Educators such as award-winning high school science teacher Janet English and middle school innovator Tyler Johnstone also contributed their on-the-job perspectives to the discussion, while Karen Cator of the U.S. Department of Education and creativity expert Sir Ken Robinson added ideas about how we learn best. English even brought some of her students to testify how they are drawn toward science. In this day and age of myriad distractions, catching the eye of students is more of a challenge than ever.

From left: Superstring theorist Brian Greene, writer/director/producer Jerry Zucker, and educator Tyler Johnstone discuss ways to attract students to the world of science.

But the program didn't begin and end with a group of experts bemoaning the failures of the education system and pointing fingers at Hollywood schlock merchants. (None of the latter was in attendance as far as I knew.) Computer-gaming wizard Will Wright talked about how well-designed games can foster great creativity by encouraging players to invent aspects of their virtual worlds. Google's chief technology advocate, Michael Jones, discussed how the Google Maps people put the "Gee!" in geography in well under a decade. All the speakers—with some poetry and animation sprinkled in—conveyed their great passion for their work and hopes for the future.

In the late afternoon, the audience was broken up into five groups and tasked with brainstorming new and creative ideas for how educators, scientists, and entertainers can empower student learning in the sciences. These organized and facilitated sessions were summarized and presented to the entire gathering at the end of the day.

The brainstorming sessions were held partially at the behest of the Science and Entertainment Exchange, a program of the National Academy of Sciences that connects scientists and other experts with those developing science-based entertainment who need help with content. Thanks to a $225,000 grant from the Gordon and Betty Moore Foundation, the Exchange "is seeking proposals to establish collaborative partnerships among scientists, entertainment industry professionals, and educators to develop educational products or services that effectively leverage the resources of the entertainment community to improve educational outcomes in science classrooms."

We in the skeptical community should welcome these efforts. Many a false belief rests on a poor understanding or a misunderstanding of how the universe works, so any improvement in science education will help us demystify a wide range of public misconceptions—from the local school-board fence-sitters who ask for equal time for intelligent design to Fox News personality Bill O'Reilly whose YouTube video shows him asking, "How did the moon get there? Who put it there?"

There are many smart kids out there who can be rescued from Bill O'Reilly's level of *argumentum ad ignorantiam*, some of whom might even become inspired enough by science to make it a lifelong pursuit. Maybe endeavors like this summit will help turn some young heads and make our lives a bit easier.

Jim Underdown is the executive director of the Center for Inquiry–Los Angeles and the chair and founder of the Independent Investigations Group.

Loftus Wins AAAS Scientific Freedom and Responsibility Award

Noted psychologist and Committee for Skeptical Inquiry fellow Elizabeth Loftus has been presented with the American Association for Advancement of Science (AAAS) Scientific Freedom and Responsibility Award.

The award notes her investigations into "false memory" and calls her "an ideal example of a scientist who is distinguished for both advancing science and applying it to make critical contributions to society."

Specifically, the award honors her for "the profound impact that her pioneering research on human memory has had on the administration of justice in the United States and abroad."

Loftus is Distinguished Professor of social ecology and professor of law and cognitive science at the University of California, Irvine. Her discovery that memories can be planted or manipulated led her to identify what has been called False Memory Syndrome. The American Psychiatric Association has declared repressed memory research "dead" because of Loftus's research, the AAAS said. Loftus is a member of the National Academy of Sciences. She is also the top-ranked woman on the *Review of General Psychology*'s list of "100 Most Eminent Psychologists of the 20th Century."

The award was presented February 19, at the 2011 AAAS annual meeting in Washington, D.C. (See page 13 for Loftus's acceptance remarks.)

Evolution May Win in Court But Not in the Classroom

Kendrick Frazier

Creationism may indeed have lost every one of its major U.S. federal court cases over the past forty years, but it may be winning the battles in America's classrooms.

That is the conclusion of a study of the evolution-creationism battle in the nation's schools by political scientists Michael B. Berkman and Eric Plutzer of Pennsylvania State University that was published in the January 28, 2011, issue of *Science*.

Berkman and Plutzer used the National Survey of High School Biology teachers whose data "reveal a pervasive reluctance of teachers to forthrightly explain evolutionary biology." Berkman and Plutzer also say the data reveal "a cycle of ignorance in which community antievolution attitudes are perpetuated by teaching that reinforces local community sentiment."

In the most socially conservative school districts, composing about 15 percent of the districts surveyed, nearly four in ten teachers personally do not accept human evolution and consequently devote little time to evolution in their classrooms. This contrasts with 11 percent who do not personally accept human evolution in the least conservative districts. These antievolution views coupled with a reluctance to teach evolution in conservative school districts help create new generations of adults with similar views, Berkman and Plutzer warn.

On the plus side, they estimate from the data that 28 percent of all biology teachers consistently implement the major recommendations and conclusions of the National Research Council. These guidelines call for introducing evidence that evolution has occurred and that it is a unifying theme in biology.

Six in ten teachers—"the cautious 60 percent"—just want to avoid controversy. Many have never taken a course in evolution and feel unconfident in their ability to defend it. These teachers fail to explain the nature of scientific inquiry and otherwise legitimize creationist arguments, even if unintentionally, say Berkman and Plutzer. "The cautious 60 percent may play a far more important role in hindering scientific literacy in the United States than the smaller number of explicit creationists."

Skeptically Speaking Podcast Celebrates Second Anniversary

Gurmukh Mongia

Weekly Canadian skeptical radio show and podcast *Skeptically Speaking* celebrated its second anniversary in March. The popular program is hosted by Desiree Schell, a scientifically minded Edmontonian who describes herself as being "constantly fascinated by how the world works." Each week Schell guides her listeners through an exploration of scientific and skeptical issues through interviews with researchers, authors, and experts.

Skeptically Speaking appears on twenty-six radio stations across North America, its podcast gets 15,000 downloads each week. The show's motto is "Call in. Question Everything." Each week Schell answers questions from listeners who either call into the show or submit a question live via the Internet. Previous guests have included Phil "the Bad Astronomer" Plait, Adam "Mythbusters" Savage, Skeptical Inquirer columnist Massimo Pigliucci, and many others.

Schell will also be a guest at the upcoming TAM (The Amazing Meeting) 9 in Las Vegas, Nevada. More information about the show and its past episodes can be found at www.skepticallyspeaking.ca.

Gurmukh Mongia operates a blog and podcast related to critical thinking called *The Dumbasses Guide to Knowledge* (www.dumbassguide.info).

Statement from CSI and CFI on Walmart's Marketing of a Homeopathic Flu Remedy

Below are excerpts from a joint statement from the Committee for Skeptical Inquiry and the Center for Inquiry on Walmart's marketing of a homeopathic flu remedy. The full statement and documentation, issued January 25, 2011, are available online at www.csicop.org/specialarticles/show/walmart_homeopathy_statement.

We are deeply concerned about Walmart's irresponsible marketing and promotion of Boiron Oscillococcinum, an ineffective homeopathic "flu medicine," through its website, www.walmart.com. Walmart's website states that the product, manufactured by Boiron, is to be used "for flu-like symptoms."

The website further states that the product's alleged active ingredient, Anas Barbariae Hepatis Et Cordis Extractum 200CK Hpus, is used "to Reduce The Duration and Severity of Flu Symptoms," and features an image of the product's package, which indicates that the product "Reduces [the] Duration and Severity of Flu Symptoms," including "Fever, Chills, Body Aches and Pains."

Walmart's misleading promotion of this "homeopathic medicine" as a treatment for flu is not limited to the webpage on which the product is displayed. Consumers will reach this page only after visiting Walmart's "Medicine Cabinet" page, which assures customers that the products Walmart carries will "fight colds and the flu." From there, website visitors will navigate to the "Cough, Colds & Flu Wellness Shop" page, which promises to help the customer "stay on top of cold and flu season by learning about products that can help you and your family stay well, relieve symptoms and recover fast." In its "Cough, Cold, and Flu Buying Guide," Walmart asserts that its products will provide the customer "with everything you and your family need for battling a cold or the flu."

In short, Walmart's entire website is replete with assurances that the products Walmart offers as flu remedies are, in fact, effective for preventing and treating the flu. People are buying Boiron Oscillococcinum based on these assurances.

Walmart's assurances regarding Boiron Oscillococcinum, however, are false and irresponsible. Boiron Oscillococcinum is ineffective against the flu and flu symptoms. Homeopathic oscillococcinum solutions were first produced in the early 20th century on the mistaken assumption that they contained "oscillococci," microscopic bacteria that proved to be imaginary. The allegedly active ingredient of Boiron's Oscillococcinum consists of mere liquefied duck liver and duck heart, substances that were thought to contain the nonexistent bacteria. Moreover, manufacturing a "200 CK" homeopathic preparation requires repeatedly diluting the "active ingredient" in water until the odds that the solution contains even a single molecule of it are effectively zero.

There is no credible scientific evidence to support the effectiveness of Boiron Oscillococcinum's "200CK" homeopathic preparation beyond what is expected from the placebo effect.

The Committee for Skeptical Inquiry and the Center for Inquiry wrote to Walmart in November 2010 regarding its inaccurate and misleading marketing of Boiron Oscillococcinum. To date Walmart has neither issued a response to nor acknowledged receipt of CSI and CFI's letter. Because Walmart has misled consumers about the product's effectiveness and ignored private pleadings to correct the situation, we are compelled to speak out publicly against Walmart's irresponsibility.

We urge Walmart to cease marketing this ineffective product immediately.

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Author; Critic; Television Director and Producer

Physicist Disputes 'Quantum Mind' in Debate Hosted by Deepak Chopra

Diana Lutz

Physicist Mark Alford spent a January day on Manhattan's Upper East Side discussing the nature of reality at the modern equivalent of an Enlightenment salon.

Alford participated in a roundtable about the quantum mind: the idea that quantum mechanical phenomena, such as quantum entanglement and superposition, may form the basis of an explanation of consciousness. Alford is professor of physics at Washington University in St. Louis.

Deepak Chopra, an endocrinologist who publishes self-help books on New Age spirituality and alternative medicine, moderated. The salon was held at the Philoctetes Center for the Multidisciplinary Study of the Imagination. The Philoctetes Center brings together scientists, artists, and scholars for roundtable discussions in an attempt to bridge the separation between the worlds of science and the humanities.

Among the discussants was Stuart Hameroff, professor of anesthesiology and psychology and director of the Center for Consciousness Studies at the University of Arizona. Together with British physicist Roger Penrose, Hameroff espouses the idea that perception and consciousness arise from the collapse of the wave function of a Bose-Einstein condensate of quantum-entangled electrons in the brain.

This happens, Hameroff claims, forty times per second—or, in the case of Tibetan monks trained in meditation, eighty times per second—so the perceived world slows down as if perception were a movie filmed at a higher-than-normal frame rate.

The guests at the roundtable also included Menas Kafatos, professor of computational physics at Chapman University in California, and Stuart Firestein, professor of neurobiology and chair of the Department of Biological Sciences at Columbia University.

Alford, a theoretical physicist who studies quark matter, was invited because he had previously defended a position that severely limits the metaphysical implications of physics. In an article in *Foundations of Physics* in 2006, he asserted that physics can "only cover limited aspects of our experience."

Alford questioned the idea of quantum mind, explaining that quantum entanglement is "usually very delicate" and "difficult to arrange." Physicists struggle to entangle even a few particles for any substantial period of time. It seems improbable, he said, that "these very delicate processes are the crucial feature of the functioning of the human brain," which is "not a suitable environment" for quantum subtlety.

Deepak Chopra

Mark Alford

"It's more likely," he said, "that consciousness arises from other, more conventional bits of science, and you don't need to reach all the way to this, the most exotic, the most delicate, the most bizarre bit of modern physics. You don't need to reach all that way."

As the discussion got underway, it became evident that Chopra was interested in pushing the boundaries of Alford's pragmatism.

Chopra to Alford: "Is there an observer-independent reality, in your opinion?"

Alford: "Yes, I don't think that anybody seriously thinks the jug of water on this table is dependent on you or dependent on me."

Chopra: "I think the shape of the jug, the color and texture depends on the nervous system. A different nervous system would perceive it totally differently. A honeybee would not experience [the same] jug. A bat would experience that as the echo of ultrasound. A chameleon's eyeballs swivel on two different axes. I can't even remotely imagine what that would look like to a chameleon. So does that jug exist as a jug by itself?"

Alford: "Yes."

Chopra: "Matter is an illusion and only consciousness is real."

Later in the debate, Alford offered some common ground: "I'm quite sympathetic to the idea of constructing these sorts of patterns of ideas that you're talking about. I just think that you don't need to—as I would think of it—contaminate them with stuff from science like quantum mechanics," he said.

Quantum mechanics is early twenty-first-century physics, Alford said, and may one day be discarded, like the late-nineteenth-century notion that light travels through a medium called the luminiferous aether.

"If you rely too much on the current scientific paradigm, wait a hundred years—it's been replaced," Alford said. "So I don't think you want to be using [quantum mechanics] as a foundation. You can use it as inspiration, you can use it in various ways, but I don't think you want to actually build on it like it's a foundation."

Chopra, the mystic, had begun the debate by saying he wanted "to home in on the limitations of science." In the end it was Alford, the scientist, who emphasized those limitations, asking that science be understood in a humble way and not as the key that unlocks the door to the "ultimate" reality.

Diana Lutz is senior science editor at Washington University in St. Louis.

The Wizards of TAMOz

Kylie Sturgess

One thing that will definitely go down in history about The Amazing Meeting Australia (TAMOz), held in Sydney, New South Wales, November 26–28, 2010, is the most unusual choice of venue. Infamous Australian radio deejay Maynard Crabbes and I puzzled over the strange items that dotted the gold-and-cream Sydney Masonic Center's Grand Lodge conference room. Were the pair of giant chairs really part of some elaborate ritual designed to worship the gods of geometry? And if so, should we rework Maynard's tinfoil hat into a more suitably equilateral shape before his guest appearance on the main stage?

A sense of humor was mandatory for this event, considering the lively atmosphere and traditional Australian congeniality. With an expected attendance of 600 people and a generously mixed lineup of local and international skeptics, journalists, entertainers, and scientists (including self-described "sleek geek" Karl Kruszelnicki, philanthropist Dick Smith, physical anthropologist Eugenie C. Scott, and U.K. author Simon Singh), tickets were sold out online within days of becoming available. Coinciding with the event were a number of "fringe" events, including the Bloggers Breakfast, the Skepticator Open-Mic night, and a number of pub gatherings and meet-ups.

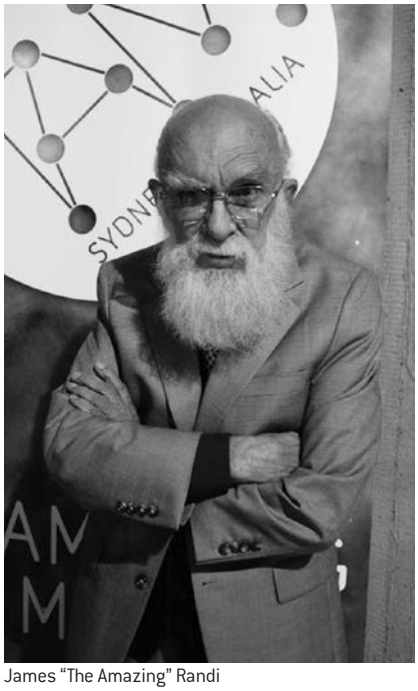
This was the first year that an Amazing Meeting was held in Australia; usually the Australian Skeptics' annual gathering is the Australian Skeptics Convention, which rotates between major Australian cities, mostly on the East coast. This year the variety of presentations was significantly expanded due to the inclusion of international guests and a distinctly younger demographic in both presenters and attendees—which was very much reflected in the social and online activity during the weekend.

Members of the generation of skeptics more apt to create blog posts than reminisce about Don Lane's attack on James Randi in the 1980s were signing up in the dozens to attend dinners hosted by their podcast heroes and groupie-gazing during the impromptu karaoke sessions at the nearby Maloney's Hotel. This was certainly not the same milieu of previous conventions in other cities, and it seemed as if the reputation and fun atmosphere of the Las Vegas Amazing Meeting (SI, November/December 2010) transplanted nicely into a Sydney setting.

But it was the sessions that captured the imaginations, minds, and hearts of even the most curmudgeonly skeptics among us. Paleontologist Paul Willis, a reporter on Australian ABC television's *Catalyst* and the inspired choice for master of ceremonies, roused the crowd with his cheerful and cheeky introductions and announcements; podcaster Brian Dunning reveled in the fact that Masonic emblems were visible while he was photographed during his discussion on mysterious sounds. The *Skeptics' Guide to the Universe* podcasters and George Hrab joined forces to create an impromptu quiz after some presentation no-shows, and Pamela Gay and Fred Watson each presented inspirational lectures on astronomy, particularly emphasizing a humility and wonder that we can all share.

Dick Smith and James Randi discussed the ever-popular Carlos hoax and their collective effort to discourage water-divining in the media. Award-winner Loretta Marron of the website www.healthinformation.com.au discussed her never-ending fight against pseudoscience and health fraud in Australia. Krissy Wilson repeated her engaging lecture from the Australian Skeptics convention in Brisbane last year, including a summary on popular beliefs and odd practices.

Science communicator Karl Kruszelnicki's scattershot approach to science facts and fictions and Rob Morrison's dazzling visual illusions made for a breathtaking ride from start to finish on the topic of deceptions and perceptions,



James "The Amazing" Randi

Members of the generation of skeptics more apt to create blog posts than reminisce about Don Lane's attack on James Randi in the 1980s were signing up in the dozens to attend dinners hosted by their podcast heroes and groupie-gazing during the impromptu karaoke sessions at the nearby Maloney's Hotel.

which was equal to any Jerry Andrus or Michael Shermer show.

Bestsellers at the Embiggen bookstore stand included Carl Sagan's *The Demon-Haunted World*; *The Australian Book of Atheism*, edited by Warren Bonett; the ever-popular *Flim-Flam* by James Randi (who was mobbed for sig-

"It is error only, and not truth, that shrinks from inquiry."
– Thomas Paine

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Members of Stop the Australian Vaccination Network show off their 2010 Skeptic of the Year Award certificates.

Pamela Gay gives an inspirational lecture on astronomy.

Conference participants include (from left to right) Bob Novella, Jay Novella, Steven Novella, Evan Bernstein, and George Hrab.

natures at regular intervals); and Simon Singh's *Trick Or Treatment?*—a book that he admitted wasn't a bestseller in comparison to some of his other books, but it was certainly snapped up by attendees after his gripping presentation on the British Chiropractic Association case from 2008.

A pertinent panel, "Entertainment and Skepticism," featured James Randi expounding on the power of connecting with an audience and an impassioned and memorable walk-out by mentalist and magician Simon Taylor, who urged us not to look down at others based on their approach to thinking and to factor in emotion and empathy when we communicate. Evidence-based medicine workshops; education, activism, and skepticism panels; and discussions about skepticism and the law were all very well attended—some even attracting standing-room-only crowds.

There was a rousing Twitter-broadcast quiz that pitted the audience against a panel of overseas podcasters, eliciting some hilarious (and unprintable) results.

Paul Willis shredded a duck in the name of science to demonstrate the evolutionary traits, including the unique fourth trochanter, found in both birds and dinosaurs. A lengthy "Psychic Predictions of 2010" session led us through a number of events that never seemed to appear in any psychics' publications.

Some of the more memorable discussions I had were with the energetic people from the *Young Australian Skeptics* podcast, who worked hard to promote not only their show but the activities of Freethought University Alliance groups across the country. With their keen questioning of current leaders in skepticism such as Eugenie C. Scott and Simon Singh, they very much represented the spirit of the new and upcoming skeptical figures.

Interest in outreach, activism, and ongoing education is familiar for those who attend skeptical conferences, but the emphasis on local activism at TAMOz was particularly pertinent to the mostly Australian attendees. The 2010 Skeptic of the Year Award was unanimously

approved when it was presented to members of Stop the Australian Vaccination Network (SAVN). Ken McLeod, Wendy Wilkinson, and Daniel Raffaele accepted the certificates on behalf of about 2,000 activists who continually watchdog the activities of one of the major anti-vaccination groups in Australia . Let's hope this dedication will encourage other skeptics to tackle similar anti-science organizations nationwide in their various guises and permutations.

Winding up the weekend, I would say that the experience was best summed up by the chair-entity of the New Zealand Skeptics, Gold (he doesn't have a first name):

> The entire event was a fantastic experience. If I had to pick one event it would have been when I realized I was having lunch with Dr. Pamela Gay. Her talk was also the one that I got the best message from: the idea that we, as skeptics, have a habit of taking things away from the true believers when we point out facts and that it would be more constructive to make them question their own position instead. Plant that seed to get them thinking and come to a rational conclusion on their own.

I for one sincerely hope that this kind of questioning, concerned feedback, and positive thinking—and the inspirations gained from it—will continue on into forthcoming Australian Skeptics Conventions, whether or not they are also "Amazing."

Kylie Sturgess is an Australian educator and podcaster on the *Token Skeptic*. Her interview with Stephen Fry appeared in the January/February 2010 SKEPTICAL INQUIRER. E-mail: podblack@gmail.com.

Skeptical App Launched on iTunes

Let's say you're in the middle of a skeptical debate or discussion and you need well-researched skeptical information right away. Maybe you can't remember who dreamed up homeopathy or what year Kenneth Arnold saw his famous "flying saucer." There's a new way for skeptics to get their quick skeptfix: *The Skeptic's Dictionary* app is now available from iTunes. The app, developed by David Knobel, easily allows access to the core terms listed on the contents page of *The Skeptic's Dictionary* website. You can scroll the contents list from *A* to *Z* or search directly for a name or term from among more than 700 items. Internet access on your mobile device is required to view the articles.

Robert Carroll, author of *The Skeptic's Dictionary* book and website, touts the app as "your one-stop source for information on weird beliefs and the critical thinking skills needed to understand and combat them. It is also chock-full of references should you wish to do more research on a topic. The content covers alternative medicine, cryptozoology, extraterrestrials and UFOs, frauds and hoaxes, junk science, logic and perception, New Age energy, and all things psychic and paranormal." The app, which is compatible with iPhone, iPod touch, and iPad, requires iOS 3.2 or later.

A Third of Russians Say Sun Revolves around Earth

Does the sun revolve around the earth? About one-third of Russians appear to believe so, according to a new survey conducted by the Russian Center of Public Opinion Research and reported by Agence France-Press.

Thirty-two percent of Russians reject a sun-centered solar system, four percentage points more than in 2007 when a similar survey was conducted by the same center.

The new survey also found 55 percent of Russians believe that radioactivity is a human invention. Twenty-nine percent believe humans lived in the era of dinosaurs. It also found that women are more likely than men to believe scientific superstitions.

The survey, which highlighted scientific superstitions among Russians, was conducted in January 2011 among 1,600 people in different regions, with a 3.4 percent margin of error.

Americans should hardly be smug. The 2010 *Science and Engineering Indicators* study (National Science Board) reports that in 2008 only 58 percent of males and 44 percent of females correctly answered the Earth-around-Sun question. (Those numbers were six and two percentage points worse, respectively, than in a similar survey in 2006).

On the radioactivity question, Americans did better than the Russians. In 2008 74 percent of American men and 67 percent of American women correctly answered "false" to the statement "All radioactivity is man-made."

We Live in Perilous Times for Science

Acceptance speech for the American Association for the Advancement of Science Award for Scientific Freedom and Responsibility given to Elizabeth Loftus on February 19, 2011.

ELIZABETH LOFTUS

I feel grateful and privileged that the research I have done on memory in the past three decades has been honored for its contributions to science and human welfare. But of all of these awards, this one, in honor of scientific freedom and responsibility, has a special poignancy for me. I never set out to carry the banner for those glorious words *freedom* and *responsibility*; I was merely a scientist interested in the fallibility and malleability of memory—a subject that turned out to be central to the "repressed memory" moral panic that swept this nation in the 1980s and 1990s. If anyone had told me in advance that my scientific commitment to knowledge would make me the target of organized, relentless vitriol and harassment (not to mention expensive litigation), I might have laughed at them—"Memory? Who gets angry over different memories?"

Every now and then I'd find myself wondering: If I'd known this in advance, would I have made the same decisions? Would I have decided to do the same kind of research, to spend countless hours in courtrooms testifying for the falsely accused, to write endless articles in rejoinder to dubious but persistent clinical ideas?

I do know that once faced with the choice between yielding to the wave of hostility and criticism that my research provoked or standing as strong as I could for science and justice, it was a no-brainer for me. But it was a decision that took an enormous personal toll, which is why this award is so meaningful and gratifying to me.

We live today in perilous times for science: conflicts of interest that taint research; pressures on scientists to cut corners to get fast results; a public culture that alternates between hostility to science and irrational expectations of what science can provide. If we as scientists want to preserve our freedom (and the welfare of others), now more than ever we have a responsibility.

And that responsibility is to bring our science to the public arena and to speak out as forcefully as we can against even the most cherished beliefs that reflect unsubstantiated myths. ■

Elizabeth Loftus is Distinguished Professor of social ecology and professor of law and cognitive science at the University of California, Irvine. She is a fellow of the Committee for Skeptical Inquiry. A news and comment piece about her award appears on page 6.

GHO$TLY ENDEAVOR: Ethical Issues Haunt Kentucky Press

Posing as respectable folklore, *Spookiest Stories Ever* is actually a sustained promotion of ignorance, superstition, and pseudoscience. That it was published by a university press is especially troubling.

JOE NICKELL

This is the story of how a respectable university press—the University Press of Kentucky (UPKY), "scholarly publisher for the Commonwealth"—came to sell out its legacy of science and scholarship. It is also the story of how I, one of its most-published authors—attempting to raise a question of ethics in the interest of the press, the state's universities, science, and the public—was treated in the process.

Joe Nickell is CSI's senior research fellow and SI's "Investigative Files" columnist. He is author of several dozen books critically examining paranormal claims, including ghosts and ghost-like entities.

"Folk"-lure

At issue is a ridiculous book on ghosts—another mystery-mongering, pro-paranormal collection that is based on a logical fallacy known as *argumentum ad ignorantiam* ("argument from ignorance," i.e., a lack of knowledge). The notion is that if you "can't explain" something (say a noise in an old house), it must therefore be paranormal (surely a ghost). Although that illogic permeates *Spookiest Stories Ever: Four Seasons of Kentucky Ghosts*, beginning with the very first sentence of the very first story, there are other problems with the book.

Take the title: Please! I've read spooky stories, and these don't compare. For my money, Ruth Ann Musick's *Coffin Hollow and Other Ghost Tales* (1977), published by the same press, is much spookier. Besides, Musick's book offers a bibliography and source notes, whereas Roberta Simpson Brown and Lonnie E. Brown—the authors of *Spookiest Stories Ever*—rather embarrassingly confess, "We were not collectors when we heard many of these stories, so we did not record the storyteller's name or the time and place of the stories" (Brown and Brown 2010, xvi).

They add, "Some of these stories are based on our own experiences…." This is interesting, because the book's jacket copy suggests a work of traditional folklore, stating that *Spookiest Stories Ever* "transports readers into the past with chilling tales that have been passed down from generation to generation." So not only do the authors not know many of their stories' antecedents, but by relating their "own experiences"—and those of family, friends, and acquaintances, which actually make up over half of the book—they reveal that theirs is not, substantially, a work of classic folklore. (In contrast, Musick's book is a collection of folktales with folk motifs, keyed to standard motif-indexes of folklore, that are helpfully identified.)

In fact, as a press release for the book observes, "The authors explore paranor-

mal phenomena and investigate some of the most haunted places in the world . . ." ("Ghosts" 2010). So this is basically a ghost-hunter's book—one promoting belief in spirits of the dead through allegedly empirical means: personal experiences, presumably by psychically sensitive persons and/or the use of cameras and other equipment that supposedly record spirit "energy."

Ghost Hunting

The authors of *Spookiest Stories Ever* are in fact self-styled conductors of "paranormal investigations with the Louisville Ghost Hunters and the American Ghost Society" ("Roberta" 2009)—groups whose approach is fundamentally pseudoscientific. Here and there throughout the book, ghost hunters make forays into "haunted" places where alleged spirit pictures (Brown and Brown 2010, 146), camera malfunctions (133), and the like are reported, along with various alleged psychical encounters (e.g., 146, 149, 153, 156). (For a discussion of ghost hunters, see Nickell 2006.)

Co-author Roberta Simpson Brown repeatedly reports her own psychic experiences. Since the age of seven (Brown and Brown 2010, 5), she has witnessed apparitions (150, 157–58, 215–16), had prophetic dreams (127), experienced "visitations" (32, 33), communicated with spirits (32, 33, 60, 244), encountered "signs" (239–45), sensed a presence (38, 61, 75, 143), felt paranormal cold spots (62, 147), and so on. Some of these paranormal experiences have come from her "ghost-hunting activities" (149). In fact, Simpson Brown—who has an "interest in the supernatural" (29)—exhibits several traits associated with a fantasy-prone personality (see Wilson and Barber 1983): she is highly imaginative, has vivid dreams, receives messages from otherworldly entities, and has "psychic" experiences, among other traits. (Her late sister Fatima also appears to have been a fantasizer, but Brown's co-author husband is less so.) Some of Roberta Simpson Brown's experiences seem consistent with common "waking dreams" that occur in the interface between being fully asleep and awake (Nickell 2004, 228–40). If she is aware of this phenomenon, she never says so.

When I first heard about the Browns' proposed book and raised the alarm, I was assured by a University Press of Kentucky editor that the collection was just "ghost stories" such as would be told around a campfire and that the press was not presenting them "as true"—certainly not as actual evidence for the supernatural. But they ended up doing just that. The book-jacket copy promises "a wealth of real-life experiences with the supernatural." The foreword refers to "moments when extraordinary events have suggested the presence of the supernatural," and it also touts a book by another press that "introduces the reader to forty-four ghost-hunting groups that have generated interesting stories" (Tucker 2010, xi).

"True" Versus the Truth

When Brown and Brown (2010) gush that a story "is incredible, but true" (28), we are apparently supposed to understand this statement as, "Well, not *true* true." The authors disclaim: "If you are looking for scientific proof that ghosts exist, or even an exact definition of what they are, you will not find the answers in this book. This is a collection of true personal experiences and stories we heard as true. We will not attempt to convert you to our way of thinking" (4–5). Oh, really? Much of the book is just such an attempt, a litany of alleged firsthand testimonials that invite the very kind of reaction that one credulous reader had: noting that the book's narratives "are offered as 'true stories,'" he added, "While it's easy to raise a jaundiced eyebrow at this notion, the cumulative effect of these plain-spoken tales inspires belief rather than skepticism" (Patterson 2010).

So the disingenuity in the book—and in its publishing campaign—is immense, with "true" being treated the way "real" is used on a carnival sideshow banner (meaning a real fake, as opposed to an imaginary one). Yes, the stories in *Spookiest Stories Ever* are "true"—in that they are not presented as fiction.

> If it takes a book cynically promoting ignorance and superstition to support one advocating science and reason, I will take a pass. My integrity is not for sale.
> —Joe Nickell

The real truth is that the stories are convincing only to those who are unaware of just how little validity such anecdotal accounts have and of the fallacy of arguing from ignorance. Actually, many of the book's reported incidents are unexplained merely because the evidence they offer is somewhere between nonexistent and doubtful. They are not at all unexplainable. Such phenomena are quite easily explained as waking dreams, misperceptions, alternative natural phenomena, electronic glitches, pranks by others, and so on (Nickell 2001; 2004; 2006; 2007). One suspects many of the Browns' reports are confabulated at best and partially or completely fictionalized at worst. Not a single ghost has ever been validated by mainstream science, and pseudoscien-

tific ghost hunters are on a fool's errand, unaware that when the brain is dead, brain function ceases—and with it, thought, speech, and motor function.

Realizing they have no "scientific proof that ghosts exist," the authors still try to have it both ways, insisting, "You must decide for yourself what you believe about ghosts" (4–5). But how can someone possibly decide when given only a phony choice? For one, we are presented "true" experiences of the supernatural, and for the other, the authors' assurance that there is no other tenable position because the experiences simply "can't be explained." This takes disingenuity to a new level. That it would bear the imprimatur of the University Press of Kentucky, which represents the state's scholarly institutions, is appalling. Will there be further such books, perhaps "true" experiences with angels or encounters with extraterrestrials?

Pseudoscientific ghost hunters are on a fool's errand, unaware that when the brain is dead, brain function ceases—and with it, thought, speech, and motor function.

Messenger Shot

Because of my concerns, I talked by phone with the head of the press, Stephen Wrinn, who was defensive (to say the least) and decried what he suggested was my attempt at censorship. Of course it is not censorship to hold works to standards of science and scholarship as befits a university press. He did not like my use of the word *ethics*, and he stated that he did not intend to have, financially, another year like the previous one. He insisted I look at the book's manuscript, which he thought I would find acceptable after all, and I agreed to take a look.

I subsequently received from an editor a copy of the manuscript (although it was missing several pages). After reading it and seeing that it was as bad as I had feared, I wrote a seven-page critique, concluding, "Surely the Press can find a more suitable collection of ghost tales to publish—perhaps a statewide anthology of folktales, ballads, etc.—rather than try to patch and prop up the Browns' unacceptable manuscript" (Nickell 2009).

But patch and prop they did—deleting a ghost hunter's term ("orbs"), for example, and making other cosmetic changes, as well as adding a foreword by a folklorist. (She mentions other collections of ghost tales, some published by UPKY, but acknowledges that "an important difference between the present volume and the books just mentioned is that the Browns tell stories from their own family and friends.")

Meanwhile, I waited for the publisher to reply to my report. An editor said Wrinn was "very interested in reading it, but he's on vacation until after the fourth" (of July 2009). That is the last I heard (a long vacation indeed!). I've heard nothing about the book, nothing about one of mine I was discussing with the press at the time (it would have been my thirteenth with them, but it is now published by Prometheus Books). And, although UPKY had just published my *Real or Fake: Studies in Authentication*, for the first such time they did not ask me to appear at the annual Kentucky Book Fair. I have no reason to believe that my report was ever shown to the UPKY board, which must approve all books based on readers' reports and the advice of staff. Did the board have access to all available and relevant information?

No doubt *Spookiest Stories Ever* will sell more than most of my books. Wrinn is correct in noting that popular books often make possible the publishing of scholarly ones (Nardini 2004), although when both are at their best (thorough, honest, and well documented on the one hand and interesting and readable on the other), there may not be so much difference after all. But if it takes a book cynically promoting ignorance and superstition to support one advocating science and reason, I will take a pass. My integrity is not for sale.

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The Case of the Miracle Oil

For a new television series on the Oprah Winfrey Network (OWN) called *Miracle Detectives*, I was invited to a home in Northern California where myriad icons, statues, and other religious effigies were "miraculously streaming oil"—"healing" oil, some claim. There I joined cohosts Randall Sullivan (whose book *The Miracle Detective* [2004] prompted the series) and Indre Víškontas (a neuroscientist and skeptic) (figure 1). Indre introduced me on the show by announcing: "Joe Nickell is one of the most prominent debunkers of purported miraculous or supernatural events in the country—maybe even the world." As it happened, I had long ago suggested the case was one of pious fraud (Fernandez 2001). What would an on-site investigation reveal?

Background

The home I visited in Union City, California, belonged to a diminutive Philippine-American woman named Cora Lorenzo. There, in 1991, she hung by the front door in her living room a holy-water font she had bought on a trip to Lourdes, the French healing shrine. One November evening in 1995, Lorenzo noticed that the water had dried up. The next morning, however, which happened to be the Catholic feast of the Pentecost, the font had mysteriously been refilled with scented oil. Both her husband and twenty-four-year-old son denied that they had placed it there.

Soon, word of the "miracle" spread, and visitors—mostly the Catholic faithful—began to come in swarms. Some left their own icons and holy figurines overnight, only to retrieve them the next day drizzled with oil. Claims of healings—from headaches to rashes to arthritis—began to be reported. More visitors came from as far away as Indonesia, Australia, Holland, and Nigeria.

In 2001, the *San Jose Mercury News* featured the oil story but included more than a trickle of skepticism. A spokesperson for the Diocese of San Jose urged such claims be given "great caution." Described as "a professional debunker," I was quoted in observing that nondrying oils like olive oil could remain fresh-looking for long periods of time. (Since they do not evaporate like water, such oils have become favored for weeping-icon trickery.) I mentioned other cases of "miraculous" oily or bloody effigies that ranged from those that remain unproven and those that have been determined to be fraudulent. Moreover, although there were unverified claims of the oil samples miraculously increasing in quantity (rather like the self-replenishing jar of oil in the Old Testament [2 Kings 4: 1–7]), the *Mercury News* reported that this did not happen to the vial of oil the newspaper received from Cora Lorenzo (Fernandez 2001).

Figure 1. The cohost of *Miracle Detectives* examine effigies with trickles of "miraculously" appearing oil at a home in Northern California.

Investigating on Site

When I met Lorenzo at her home on May 24, 2010, she hugged me and said she had wanted to meet me ever since I appeared on a Discovery Channel special on miracles some ten years before (figure 2). The home was filled with effigies, including statues of the Virgin and the children of Fatima, multiple

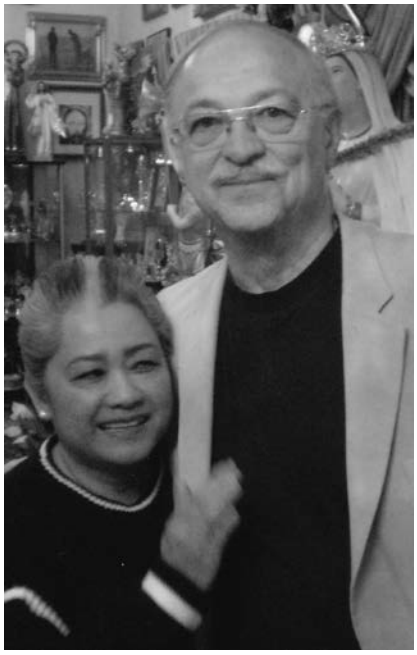

Figure 2. The author poses with Cora Lorenzo, whose home is famous as a shrine that pilgrims visit for "healing" oil.

copies of the image of Guadalupe and the Shroud of Turin, and other such reproductions.

Initially puzzled by the proliferation of oil, Vískontas nodded understandingly as we toured the display and I pointed out, using a magnifier, how the oil was often suspiciously placed (figure 3): it was spattered onto a mirror, placed above or outside the eyes of statuary for an unconvincing "weeping" look, separately placed (not dripped from the eyes) onto hands, and indeed was indistinguishable from careless human placement. In addition, Vískontas wondered aloud why the oil would appear not only on religious items but also on walls, door jambs, and the like.

The *Miracle Detectives* segment on the case, "Mysterious Oils" (the second part of the January 5, 2011, episode), featured a forensic construction expert, Robert G. Cox, who has fifty years' experience in building inspection. Cox's findings matched my own. Demolishing the idea that the oil was somehow seeping into the room from outside—as by Lorenzo possibly having "leaky oil tanks in her attic" (Fernandez 2001)—Cox pointed out that the gypsum drywall was covered with enamel paint, which he observed "is a fairly dense material." Using a pocket microscope he observed "dots" of oil, indicating it had been splattered onto the wall—similar to the spatter patterns I had noted here and there. Cox concluded the oil was therefore appearing from inside the room.

But was the oil freshly flowing as some people believed? It was never doing so, apparently, when the scene was properly observed. As the *Mercury News* reported nearly a decade earlier (Fernandez 2001), "During a reporter's two visits to Lorenzo's house, oil was present on the walls and statues, but did not flow on either occasion." I showed Vískontas how a trickle that is already on a statue or icon could go unnoticed from one low-light vantage point, then, as the viewer moved, catch light and glint as if it had suddenly appeared. (I have been at sites where flickering candles placed before an oil icon could cause the trickles to seem to be moving—flowing—although they were actually static.) There were no unambiguous fresh flows during the two days I was on site.

Still, we agreed to test the issue using video surveillance, although Sullivan was somewhat uneasy, feeling it amounted to "testing God." However, he said to me, "That's what you're here to do is test God, so, yeah." Lorenzo gave her permission to do whatever we wanted, so we wiped down a large oil-exhibiting statue of the Virgin, emptied the Lourdes font, and then trained a surveillance camera on each. We also placed a small statue in a plastic bag, which Vískontas and I heat-sealed to prevent tampering, and (although not shown on the program) I took custody of another that I monitored overnight in my hotel room. The next day the three of us reconvened at the Lorenzo home to check the results of our tests. Not a single trace of fresh oil had appeared anywhere, as far as we could tell—certainly not on the effigies and font we had under observation. Things were not looking very miraculous.

[Oil] was spattered onto a mirror, placed above or outside the eyes of statuary for an unconvincing "weeping" look, separately placed (not dripped from the eyes) onto hands, and indeed was indistinguishable from careless human placement.

Healing Oil?

Nevertheless, how do we explain the reported healings? First of all, they are just that: reported. Besides, claims of "miraculous" healing are invariably predicated on being medically inexplicable, so claimants are simply engaging in a logical fallacy, *argumentum ad ignorantiam* (an "argument from ignorance")—that is, drawing a conclusion based on a lack of knowledge.

In fact, there are many potential explanations. For example, some illnesses such as multiple sclerosis are known to exhibit spontaneous remission. Other reputed cures may be attributable to such factors as misdiagnosis, prior medical treatment, psychosomatic conditions, the body's own natural healing mechanisms, and other factors. For such reasons, the international panel of physicians appointed by the Catholic Church to identify "miracles" at Lourdes, the French "healing" shrine, announced in 2008 that it would end the practice. Now the panel will only indicate that some cases are "remarkable." And remarkable healings may happen to anyone—independent of supposedly magical oil (Nickell 2008).

Miracle Detectives examined the claim of a woman named Marlene Alberto who reported having been miraculously healed of an eye ailment. Her "symptoms suggested" that she had a macular hole in her left eye. Reportedly, doctors recommended she have surgery; she preferred not to accept the risk, instead anointing her eye with oil from the Lorenzo home, whereupon the hole surprisingly closed. The show consulted Ronald P. Gallemore, MD, PhD, who pointed out that "spontaneous closure" sometimes occurs in such cases, with the opening filling in with scar tissue as a result of the body's own healing processes. Although such spontaneous closures are rare, they are not medically inexplicable and do not warrant the term *miracle*.

A Case of Deception

When we emptied the Lourdes font using a syringe, we filled some flint-glass vials with the oil—one of which I kept while two others were sent to Flora Research Laboratories for testing. Meanwhile, the show consulted David Stewart, author of *Healing Oils of the Bible* (2002)—which is published by an aromatherapy company and touts the inclusion of God and his creations (e.g., oil-producing plants) in health care. Stewart sniffed a sample of the Lorenzo oil and found it to have a "spiritual" quality. However, he did suggest that analysis of the oil could be significant since "God's oils are not synthetic by definition."

Figure 3. The author examines an oil-weeping Madonna on the porch of the Lorenzo home. (Photos by Joe Nickell)

Often, the testing of substances from weeping icons is of little benefit because, presumably, a deity could use any substance it wished and, anyway, it is the question of how the substance got on the effigy in the first place that matters. For example, actual "salty tears" were reported to flow from a plaster bas-relief in Pavia, Italy, but then the owner was secretly observed applying the liquid with a water pistol (Nickell 1997). Nevertheless, in several cases tests have been revelatory. In 1913, a color print that "bled" was exposed when the substance failed tests for human blood; in 1985 a bleeding statue of the Virgin at a home in Quebec was exposed as a hoax when the blood was tested and found to be mixed with animal fat (so that when the room warmed from pilgrims' body heat the substance would liquefy and flow realistically); and a case in Sardinia in 1995 was solved when DNA tests showed the blood was that of the statue's owner. In yet another instance, involving a home with statues on which oil appeared in the presence of a comatose girl, the substance proved to be 80 percent vegetable oil and 20 percent chicken fat, consistent with the use of kitchen drippings (Nickell 1999).

With such cases in mind, I was happy the Lorenzo oil was to be tested. The laboratory report was instructive. While the substance was a vegetable oil, tests also revealed the presence of a glycol ether—a synthetic compound used as a fixative by the perfume industry ("in order," Vískontas explained, "to keep elements together"). Sullivan agreed with Stewart that it was unlikely God would need to use a synthetic material.

With regard to the other evidence (especially the placement of the oil), he said to Vískontas that although he was disappointed, "You and I both agree, I think, that somebody's putting that oil there." That had always seemed likely to me, but now there was a preponderance of scientific evidence to that effect thanks to the *Miracle Detectives* investigation. ■

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I Was a Teenage Psychic

The psychic looks at us from the television screen and says, "Take out your broken watches and your cutlery and bring them close to the television set: I will try to make something happen in your own homes! Broken watches may start ticking again and cutlery might bend; also, look out because other strange phenomena may happen: the chandelier may swing or the TV may go off. . . ."

The psychic then attempts to cause the hands on the TV host's watch to move backward by way of his "psychic powers." While doing this, he invites the viewers to concentrate on their own watches, which the psychic is also trying to fix. Suddenly, on the host's watch we see that the time has gone back two hours! Now is the time to check if something has happened in the homes of the viewers: they are invited to call the TV station and tell about their experiences. The phones in the studio's offices start ringing with miracles being reported with each call: a watch, stopped for many years, now runs perfectly; another one has jumped ahead one hour; a Rolex watch, whose whole inside mechanism needed to be replaced at an estimated cost of nearly $1,000, now works perfectly. Over twenty-four more phone calls from people reporting to have seen their broken watches being fixed follow!

But that's not all: dozens of other people call to say that their spoons, forks, and keys have bent; a glass of water has begun to boil; a TV set has gone off; and much, much more (see table 1 for a description of the phenomena reported by TV viewers during this hour of broadcasting).

The episode just described really took place in 1992 when, as a guest on a popular Italian TV show, *L'Istruttoria* (*The Inquest*), I had a chance to test a theory I was rather curious about. With the complicity of the show's host, I intended to pose as a psychic and duplicate a demonstration that, during the 1970s, had made famous a man who claimed to possess real psychic powers: Israel's Uri Geller.

For a few years, Geller had been able to convince people (including scientists) that he could bend keys and forks, guess drawings in sealed envelopes, and predict future events with the power of his mind. After various investigators showed that his claims had no scientific basis (Randi 1975; Marks and Kamman 1980; Gardner 1981), his career as a psychic superstar faded.

One of the most convincing performances of this charismatic character was, in fact, his apparent ability to cause strange phenomena to happen directly inside the houses of TV viewers. After this phenomenon regularly occurred (as dozens of phone callers could testify each time), the most obvious conclusion for most of the audience was that the phenomenon had to be real because Geller could not possibly have had so many stooges faking support for his claim.

The paranormal, however, most likely has nothing to do with this demonstration; the explanation in fact could lie more easily in an interesting effect of mass suggestion. It was not the first time I posed as a psychic to test this theory. In 1989, in fact, James "The Amazing" Randi asked me to claim psychic powers on a radio show in order to later demonstrate, during the *Exploring Psychic Powers Live!* TV show, how anyone could duplicate this phenomenon just by the clever use of suggestion. I did as Randi instructed and went on the radio show and claimed that as I was talking incredible things would start to happen in the houses of the listeners.

After only five minutes or so, about twenty people called reporting the strangest things: a television set had turned on all by itself; a cat was behav-

After only five minutes or so, about twenty people called reporting the strangest things: a television set had turned on all by itself; a cat was behaving strangely; a picture had fallen from the wall; a bulb in a lamp had exploded… and much more.

ing strangely; a picture had fallen from the wall; a bulb in a lamp had exploded; a book on spiritualism had fallen from the table; the whole computer network of a lawyer's office had gone down; and much more.

There was nothing extraordinary about those things. They happen often but nobody pays much attention them or thinks that they must be related to some psychic phenomenon; however, after the listeners had been alerted by me to watch for unusual phenomena, almost any event that occurred while I was talking could easily be interpreted as evidence for my claims by the most suggestible people.

Let's try, then, to understand the psychological conditions that can generate and enhance a similar belief in some listeners.

Persuasion in Action

We are obviously dealing with some of the major principles of persuasion, including the reciprocity principle, the authority factor, the motivation and coherence principle, the shortage principle, the sympathy principle, and the social confirmation principle. Robert B. Cialdini has summarized these principles very clearly. According to Cialdini, these principles come into play almost automatically and therefore are easily exploited by those who know how they work. Let's see how these principles apply to the situations described above.

First of all, the "psychic" sets the stage: he presents himself to the public as a believable person. In my case, at the beginning of the radio broadcast, the host told his listeners that some Italian universities were conducting experiments on my powers; on TV, I was able to demonstrate my claimed powers by bending and breaking a spoon, correctly guessing a drawing sealed in an envelope, and making some radish seeds germinate in my hand. In other words, I had offered something solid to the viewers: convincing demonstrations of extraordinary powers. The reciprocity principle, which states that we have to reciprocate when we're given something, was then activated. In this case, in exchange for my demonstration the TV viewer might have felt more obligated to give what I had to say more attention.

Furthermore, in both cases my claims were not doubted by the hosts: both expressed their belief in their reality and pretended they were very puzzled. This way, I was benefitting from the authority factor, a principle whose strength has been clearly shown by Stanley Milgram. Owing to the sense of compliance toward authority, which is profoundly infused in human beings, some spectators may well have surrendered to the judgment of the hosts and undertaken the same attitude of wonder that the hosts exhibited toward my claims. At this point, the message we wanted to get through—namely, that I had real psychic

Table 1. Phenomena Reported by the TV Viewers of *L'Istruttoria* During an Hour of Broadcasting

Italian City	Phenomena	Notes
Cesate (Province of Milan)	three watches restart	had been stopped for at least four years
Arezzo	watch runs briefly	had been stopped for more than 100 years
Senago (Province of Milan)	watch starts again	had been stopped for two months
Perugia	clock works again	had been "broken"
Cagliari	two watches restart	had been stopped for ten years
Cuneo	watch jumps six hours ahead	had been stopped at the time
Roma	watch restarts	had been stopped for years
Milano	watch restarts	had been "broken"
Parma	clock runs an hour	had been broken for two years
Napoli	watch runs briefly	had been stopped for years
Milano	clock runs backward	had been stopped for twenty-five years
Frosinone	watch runs fast	had been "broken"
Milano	watch restarts	had been stopped for two years
Bari	clock runs fast	had been stopped for two years
Alghero	watch (Rolex) restarts	owner saved from expensive repairs
Province of Milan	two spoons are misplaced	stopped watch also started
Fidenza	watch jumps an hour ahead	had been stopped for months
Napoli	two watches restart	had been stopped for years
Roma	watch restarts	had been "broken"
Mazzara del Vallo	key bends	It was not the one held in the hand
Catania	watch hands go back and forth	had been stopped for two years
Modena	bent spoon straightens	also the TV set went off
Torino	Four pieces of cutlery bend	
Bari	fork bends "by itself"	
Imperia	glass of water "boils"	had already happened
Cuneo	spoon bends	a watch also stopped
Trieste	spoon bends	had already happened
Napoli	watch restarts	had been stopped for a long time
Cagliari	watch breaks up	
Cagliari	pendulum clock stops	

powers—was already appearing as a consistent hypothesis by a considerable number of the viewers.

For the persuasion to be effective, however, the spectators had to feel motivated to participate in the experiment—and what better motivation than the possibility of personally living an extraordinary experience and coming face-to-face with the supernatural? This persuasion was especially effective because I was constantly repeating that these phenomena didn't happen all the time and didn't happen to just anyone: only the few "chosen" ones could live this wonderful experience. This is the shortage principle: an experience appears more attractive if its availability appears to be limited.

Also, the fact that I had an unassuming attitude (and that I apologized various times in case the demonstration failed) helped to make me more likeable: without acknowledging it, the spectators were wishing for everything to go well and were ready to act their part toward achieving this aim.

At this point, the spectators were ready to interpret anything happening in their houses (no matter how prosaic) as proof of the reality of my psychic powers. There was still one more very important persuasive factor that played a role as soon as the phone calls started arriving: the social confirmation principle. "If so many people call to say that their cat is behaving strangely or that their watches are working again," some spectators may have wondered, "maybe I should call in to say that the light went off for a few seconds!"

The illusion created by the number of phone calls coming in was that *all* the spectators tuned into that same channel were personally experiencing some spectacular demonstration of psychic phenomena—a fact that inevitably nourished further phone calls and could have very well resulted in headlines on the following day's newspapers had we not revealed the experiment. In reality, the small percentage of spectators calling was enough to quickly jam the switchboard of the TV station for a few hours.

Conclusion

Considering the complexity of the world in which we live, it is natural that people, in making their decisions, do not take advantage of all the available data but rely only on some isolated and representative item. This "economy" strategy to proceed by shortcuts inevitably leads us to make inferences on the basis of incomplete data; consequently, wrong decisions are often made. As Cialdini (1984) wrote: "We need simple, reliable, and effective rules of conduct. But if the tricks of the sharks undermine their functionality, we loose faith in these rules; we then use them less, and we find ourselves ill equipped in facing the burden of decisions that today's life places upon us. We can't surrender to this without fighting. The stakes are too high" (217). ■

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[THINKING ABOUT SCIENCE MASSIMO PIGLIUCCI

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The Science of Unique Events

There has been a modicum of soul-searching and much finger-pointing in the United States in the past several weeks in the aftermath of the Tucson shootings, in which a gunman armed with a semiautomatic pistol killed six people and injured thirteen more. Was the violent rhetoric recently displayed by so many politicians on the right causally responsible for Jared Lee Loughner's lethal rampage? Or does the tone of political discourse have nothing whatsoever to do with individual, inherently unpredictable, acts of violence?

I will not enter here into the merits of the political discourse, although as a philosopher with an interest in ethics I must mention that the kind of rhetoric we have seen of late on prominent display by so many of our politicians is most definitely not a good thing—ethically speaking, if nothing else.

Still, the question remains but is—I will argue—simply impossible to answer. We do have other examples of similar questions, however, and perhaps we can learn from those. For instance, former Vice President Al Gore has been roundly criticized, I think justifiably, for implying in his book and movie, *An Inconvenient Truth*, that we can causally link individual disasters like Hurricane Katrina to the (in my mind, undeniable) global trend of climate change. Similarly, on November 2, 2010, the U.S. Supreme Court heard arguments concerning a California law prohibiting the sale of M-rated video games to minors, a law that was passed on the assumption that one can establish a causal link between a general trend (more and more young people play violent video games) and individual acts of violence perpetrated by a small subset of the target population.

The critics of all three purported links—political rhetoric and the Arizona shooting, climate change and Katrina, and video game violence and individual episodes of actual violence—are correct. There is no way to reliably connect any individual event to a general trend because we typically have what philosophers call a very limited epistemic access to the complex causality that determines individual events. Consider the classic example of a house fire. The official report by the fire department may say that, for instance, a cigarette left accidentally burning near a mattress caused a fire. But that fact in and of itself is insufficient to determine causality. Several other causes must have concurred, including the actions of the person who was smoking said cigarette, the fire alarm that did not go off, the sprinkler system that was insufficient, the delayed response of the fire department itself, and so on. We tend to focus on the burning cigarette because from the human perspective, and particularly in terms of legal and perhaps moral responsibility, that seems to be the crucial event. But we need to understand the very special meaning of "crucial" in this case.

Again, back to the Arizona tragedy: Suppose that the suspect, Jared Lee Loughner, actually told the police that the reason he started shooting in that shopping center that morning was because he was convinced by radio talk host X or politician Y that something

I must mention that the kind of rhetoric we have seen of late on prominent display by so many of our politicians is most definitely not a good thing—ethically speaking, if nothing else.

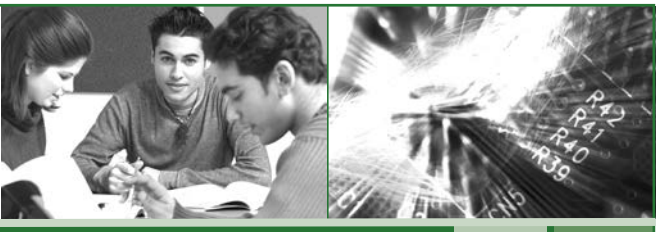
had to be done in order to save America from the disasters caused by Democrats who voted for health-care reform. Even then we cannot really say that the rhetoric actually caused the tragedy because several other factors had to enter into it—from the ready availability of semi-automatic weapons to something going clearly wrong in Loughner's own brain. After all, plenty of other people, including many gun owners, heard or read the same inflammatory words uttered by right-wing politicians and commentators, but that was not sufficient to make them go out and start shooting people.

Is there therefore nothing that science can say about this sort of question? If not, then we are looking at a pretty serious practical limitation of the scientific approach to understanding reality. I don't think the situation is that dire. What we can do is to ask a different but related question: Is there a statistical connection between a certain class of events (increase in political rhetoric, climate change, sales of violent video games) and another class of events in which we are particularly interested (number of violent assaults on political targets, number of hurricanes, episodes of youth violence)?

That is the sort of question that science is equipped to answer, at least broadly speaking. I am not aware of available data pertinent to a connection between political rhetoric and violence against politicians, but we do have data in the other two cases. According to a review by Beth Azar for the American Psychological Association (http://goo.gl/4p80A), a broadening consensus based on meta-analyses is emerging that yes, there indeed is a relationship between violent video games and young peoples' attitudes toward violence and the likelihood that they will engage in violent acts. Similarly, a report published by the U.S. Global Change Research Program (http://goo.gl/RDlpG) confirms the existence of a statistical relationship between increased tropical sea surface temperatures and intense tropical cyclone activity, at least from 1970 on (data before then is not sufficiently reliable to establish longer term connections).

Of course, as is often the case in current science, none of this is even close to being settled. Some psychologists disagree with the above-mentioned meta-analyses, and our conclusions concerning hurricanes are tempered by the fact, for instance, that there is no correlation between increased sea surface temperatures and the number of storms (only in their intensity). And then there is always the very tricky issue that a correlation suggests (sometimes strongly) but does not establish a causal link. Still, particularly when it comes to important social issues (violence, climate change) we need to make decisions with the best science we have, not the best we can ideally hope for. This is why I am really curious to see whether there are studies examining the potential statistical link between political rhetoric and violence. ■

SCIENCE AND THE PUBLIC



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"Psychic Vibrations" has appeared in the SKEPTICAL INQUIRER for the past thirty years. Sheaffer is also author of *UFO Sightings: The Evidence* (Prometheus 1998). His website is at www.debunker.com.

Abductology Implodes

Abductology is the study of alleged UFO abductions. Not since the sudden demise of Marxist-Leninism has any subject, real or imagined, self-destructed so suddenly and completely as abductology has just now managed to do.

Twenty years ago, abductology was riding high, led by its troika of John Mack, a respected Harvard psychiatrist; Budd Hopkins, artist and amateur hypnotist; and David Jacobs, onetime UFO historian turned abduction guru. The earliest reported UFO abductions in the United States—Betty and Barney Hill in 1961 and a trickle of others, including Travis Walton in 1975—typically involved going outside to some lonely and deserted spot at night, where one allegedly encountered aliens and was kidnapped. It was Hopkins who severed that connection completely in the early 1980s. No longer was it necessary to be outside in some scary place at night for a UFO abduction to occur: in the new Hopkins-style abductions, the aliens could come right into your bedroom and snatch you up, often passing through solid walls in the process. According to Hopkins, if your kid calls out "Mommy, there's a monster under my bed," the kid just might be right.

Abductology became so credible that CBS-TV produced a 1992 prime-time miniseries based on Hopkins's book *Intruders*, the same year there was an "Abduction Study Conference" at Massachusetts Institute of Technology (MIT) sponsored by David Pritchard of the physics department. So confident were the abductologists that they were ready for prime time, they invited journalists, academics, and even skeptics (I attended for the Committee for the Scientific Investigation of Claims of the Paranormal, now CSI—the Committee for Skeptical Inquiry). However, MIT went to extraordinary lengths using "non-disclosure forms" to control how the conference was reported.

The conference, however, did not unfold as smoothly as its organizers planned. Many academics, even those inclined toward UFO or paranormal belief, objected mightily to the loose "methods" of Mack and his gang. In one of Hopkins's talks, he described a survey he conducted of children by showing them pictures of unusual things to determine which ones they were familiar with. Their answers supposedly indicated whether or not they might have been abducted. He was met by an avalanche of objections: he didn't normalize; he didn't validate; etc. In other words, his survey was worthless. Chastened, Hopkins said something like "I'm sorry. I'm just an artist and I don't understand all that technical stuff. I thank you guys. That's why we invited you here, to help us." Not long afterward, Mack described some sort of test or survey he was doing with his subjects. He ran into similar objections from the scientifically literate crowd. I was waiting for Mack to say, "I'm sorry. I'm just a professor of psychiatry at Harvard University, and I don't understand all that technical stuff." But he did not.

So what brought down abductology? In a deadly one-two punch, "Emma Woods," the alias of one of Jacobs's former subjects, is now publicly accusing him of unprofessional conduct and has recordings to support her allegations. This was followed by Hopkins's ex-wife spilling the beans about his gullibility and intellectual dishonesty.

"Woods" was a hypnotic subject of David Jacobs from 2004 to 2007. All of her sessions took place over the telephone. She has written long and detailed accounts of her complaint against Jacobs, which she has circulated widely within UFOlogy circles. Assuming she can document all of her charges, Jacobs appears in a sorry light indeed. She accuses Jacobs of telling her, during hypnosis sessions, that she suffers from Multiple Personality Disorder (MPD). She also accuses him of planting false memories in her of evil aliens abducting her, raping

her, and even trying to kill her. She says she felt sick every time she saw the ocean because she "remembered" an alien hybrid holding her head under water. In 2006 Jacobs wrote to her in an e-mail: "I am in a rather severe crisis with the aliens. I will be talking to them tonight about my future and what they will or will not do to me." The alien hybrids were using another woman's instant messaging account to communicate with him (but of course she did not type the messages, the hybrids did). Apparently, Jacobs reached an agreement with the aliens: he would agree to check their online messages frequently, and they would agree not to abduct him to implant a tracking chip. Problem solved.

> us—exactly what he ordered for the book he was writing. However, it's anything but a typical abductee's experience: violent sexual encounters with a human/alien hybrid; a request by the good Doctor (Ph.D. in history, non-medical) to send him her panties, unwashed, so they could be tested for alien sperm; and a proposal that she [was to] wear a chastity belt with nails across the vaginal opening, which he'd locate for her from (in Jacobs words) "a sex shop that specialized in bondage/dominance, a place that I frequented quite often."

An experienced documentary filmmaker in the medical field, Rainey soon realized that "what Hopkins and Jacobs claim as 'the powerful evidence' for alien abductions and hybrids among us is based primarily on the powerful, hypnotic repetition of their own proclamations—and the public's gullibility in believing whatever unfounded theories these star paranormal investigators punt down the field." She became increasingly skeptical of one of Hopkins's star abductees, James Mortellaro:

> Several things about this case were making me increasingly uneasy. It wasn't just the pills and the pistol [that he always kept in his boot]. Or the fact that none of Jim's claims had been checked or verified. Among his more mundane statements, Jim Mortellaro had earlier told Budd that he had two Ph.D.s (Really? That's impressive, the skeptical wife thinks from behind the camera. From which universities?) and that he'd been "the Marketing Director for Hitachi" before retiring early. (Really? Was that Regional, National, or International Marketing Director?)

In 2006 Jacobs wrote to ["Woods"] in an e-mail: "I am in a rather severe crisis with the aliens. I will be talking to them tonight about my future and what they will or will not do to me."

"Emma Woods" is now considering legal action against Temple University, Jacobs's employer. (Jacobs has no training in medicine, psychology, or hypnosis; he is a historian.) The woman even has a website at www.ufoalienabductee.com/.

Jacobs's website (www.ufoabduction.com/) has a response to what he calls the "defamation campaign" against him. Referring to "Emma Woods" as "Alice," Jacobs says that she appears to suffer from Borderline Personality Disorder and has been experiencing an "emotional breakdown."

The second punch, one I was not at all expecting, comes from Carol Rainey, the ex-wife of Hopkins. Upon reading the "Emma Woods" account, she jumped into the fray:

But Hopkins wasn't curious. Later, Hopkins received several phone messages from individuals who called to confirm key portions of Mortellaro's story. Hopkins may have been fooled by them but Rainey wasn't: "I've spent twenty-plus years in post-production suites, with the editor or the mixer altering voices up, down, and sideways," she told her husband. "It's certainly not rocket science and Jim knows electronics. Listen, that's his syntax, that's the way he says 'very concerned' and drops his 'gs' on certain words." But instead of becoming suspicious of his "abductee," Hopkins became angry with his wife.

Rainey assisted her husband in editing his book on the famous abduction story of Linda "Cortile" (her surname was an alias). According to Rainey:

> It was highly dramatic, paced like a thriller—full of otherworldly treachery, forbidden love, UFOs over Manhattan, twenty-two witnesses, a heroine whose red blood cells were immortal, lusty and dangerous Secret Service agents, a Prince from afar, gifts of many fur coats, chases on foot, more forbidden love, an X-rayed alien implant, Linda's abduction into a spacecraft accompanied by an important world leader, her abduction into a spacecraft with other members of Budd's abductee support group, and her abduction into a spacecraft accompanied by a famous Mafia don. Then, later, as the story continued to unfold (long after the book's publication), Linda's presence in the lobby of the World Trade Center when the planes hit and her bloody, barefoot escape over shards of glass. Although . . . not all of those events reported above by Linda Cortile had been selected by Budd for inclusion in the book. I knew about them, but they weren't in the book.

The fact that the book was titled *The Brooklyn Bridge Abductions* did nothing to enhance its credibility. This story already produced a huge stink in UFOlogy during the 1990s when some UFOlogists tried to independently confirm some of Linda's wild tales and came up with nothing (see my "Levitated Linda, Ear Coning, and Arkeology," SI, Spring 1993). Worse yet, Hopkins "continued to tout the major significance of the case long after he knew that Linda had lied to him on multiple occasions," according to Rainey.

Another thing we learn from Rainey is that Leslie Kean, the author of the best-selling book *UFOs: Generals, Pilots, and Government Officials Go On the Record* is "Budd's new protege, advisor, and all-round organizer" (see my review of her book in the March/April 2011 Skeptical Inquirer). Now we begin to understand why Kean is so impervious to any facts that contradict her published position: she likely learned this *modus operandi* from Hopkins. Rainey notes, "In our house, the words 'debunkers' and 'skeptics' were used very much in the way that devout Christians use the words 'unbelievers' and 'the unsaved.'" Rainey observes:

> The two best-known abduction investigators, Budd Hopkins and David Jacobs, work almost exclusively alone (separately, although with extensive telephone exchanges), without supervision (and are unwilling to accept any), and without any training in medicine or psychiatry or neurology. A bit of comparative religion, anthropology, and folklore under the belt wouldn't hurt, either, in dealing with these difficult-to-interpret human experiences. They're not required to get authorization for their experimentation on human beings from an Institutional Review Board (IRB), a clearance that's required of every legitimate institutional researcher in the country. Its peer review of a proposed study using human subjects [is] strict, and researchers are required to report back to the IRB with their findings. None of this applies to UFO researchers.

Carol Rainey's long and revealing article can be found online at www.paratopia.net/paratopia_magazine/mag_preview_final.pdf. Her website is at www.carolrainey.com/home.html.

In hindsight, this outcome was inevitable. As anyone who ever tried to have a rational conversation with either Hopkins or Jacobs can attest, the two men are extraordinarily smug and self-righteous, even pigheaded. They are correct; you are wrong and probably stupid as well. It's as simple as that. (Apart from a quick "Hello, how are you?" in passing, I never got a chance to chat with Mack. The circles he moved in were far too rarefied for me to enter.)

"In our house, the words 'debunkers' and 'skeptics' were used very much in the way that devout Christians use the words 'unbelievers' and 'the unsaved.'"—Carol Rainey

In their own circles, each of these three men is a god, more or less, and one doesn't question godlike beings. There's truth in the old biblical saying that "Pride goeth before a fall." When someone smugly thinks he is invariably correct no matter how foolish his pronouncements (somehow Sylvia Browne comes to mind), sooner or later that foolish factor will grow so large that even many of the person's sycophants won't be able to ignore it.

Whither abductology? John Mack was struck by a car and killed in 2004. Budd Hopkins has been publicly humiliated by the shocking exposé of his knavery and foolishness written by his ex-wife and former collaborator. As for David Jacobs, if there were a contest for "stupidest and most humiliating statements," he would be a strong contender. No doubt UFO abduction claims will trickle on for a while, but it's clear that abductology as practiced by the troika in its heyday is now considered to be an embarrassing chapter in the history of UFOlogy that should be forgotten as quickly as possible. ■

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The Memory of Water

Homeopathy is nonsense and superstition diluted beyond all reason and given as a remedy to the grossly misinformed or scientifically illiterate. And yet there persists that very odd creature, the modern homeopath. While the practice is indistinguishable from ritual and witchcraft (with all due apologies to witches), the modern homeopath would like to cloak himself in the respectability of science. That is the path to acceptance, official recognition, and reimbursement. So homeopaths have added a new head to their hydra of pseudoscience—the memory of water.

A Brief History of Homeopathy

Homeopathy was invented (it is not accurate to say it was discovered, which would imply it has some basis in reality) by Samuel Hahnemann in the late eighteenth century. Hahnemann developed his principles of homeopathy from anecdote and superstition without any chain of scientific research, evidence, or reasoning. It is therefore no surprise that more than two hundred years later, scientific progress has failed to validate any of Hahnemann's ideas (House of Commons 2010).

Scientific knowledge builds on itself, and when someone discovers a fundamental property of nature, it leads to further discoveries and a deepened understanding. Homeopathy led to nothing. Hahnemann's "law of similars" is the notion that "like cures like"—that a small dose of a substance will cure whatever symptoms it would cause in a high dose. This, however, is not based upon anything in biology or chemistry. It is often falsely compared to the body's response to vaccines, but this is not an apt analogy.

Hahnemann's "law of infinitessimals," the notion that a substance becomes more potent when diluted, violates the law of mass action and everything we know about chemistry. Also, many homeopathic remedies are diluted past the point where even a single molecule of the original substance is likely to be left behind. Hahnemann believed that the water retained the magical "essence" of the substance, which makes homeopathy a vitalistic belief system.

Hahnemann's ideas are sufficiently silly that even at the time, early in the history of science, they were ridiculed and dismissed. Homeopathy remains utterly nonsensical, but it is now much more sophisticated nonsense.

A recent fascination with unscientific health modalities has caused a resurgence of interest in homeopathy, leading to many clinical trials of the effectiveness of homeopathic products for specific ailments. After hundreds of clinical studies of homeopathy, systematic reviews reveal that homeopathic remedies are indistinguishable from placebos (another way of saying that they do not work) (Ernst 2010).

This is not even a scientific controversy—the evidence that homeopathy cannot work and does not work is overwhelming. Only ideology, wishful thinking, and scientific illiteracy keep it alive.

Water Memory

Modern defenders have desperately tried to justify homeopathy with scientific-sounding explanations, but they have failed miserably. One such attempt is the notion that water is capable of having memory—that it can physically remember the chemical properties of substances that have been diluted in it.

The notion of water memory was first raised by French homeopath Jacques Benveniste in 1988. He was not studying the water structure itself, just trying to demonstrate that water can retain the memory of antibodies or other substances diluted in it. His research, however, has been completely discredited due to the many flaws in Benveniste's methods, his lab's cherry-picking of data, his improper statistics, and his recounting data points that did not fit their desired results (Scrimgeour 2007).

Materials scientist Rustum Roy, who was enamored with spiritual healing, built upon Benveniste's discredited research, claiming that water molecules are like bricks—they can be used to build structures that contain greater complexity and information than the bricks themselves. Specifically, water molecules can encode in their structure the chemical properties of what was diluted in them.

However, the evidence does not support this claim. What has been demonstrated is that water molecules form transient bonds with other water molecules, creating a larger ultrastructure—but these water structures are extremely short-lived. They are not permanent. In fact, research shows that water molecules very efficiently distribute energy from these bonds, making them extremely ephemeral. One such research paper concludes: "Our results highlight the efficiency of energy redistribution within

the hydrogen-bonded network, and that liquid water essentially loses the memory of persistent correlations in its structure within 50 fs" (Cowan 2005). That's fifty femotoseconds, or fifty quadrillionths (10^{-15}) of a second. Contrary to Roy's claims, water does not hold memory. In fact it is characterized by being extremely efficient at *not* holding memory. Scientists can argue about whether or not water can display ultrastructure lingering for longer than femtoseconds under certain conditions—but they are arguing over incredibly small fractions of a second.

Recently Nobel Laureate Luc Montagnier has given a boost to the "water memory" hopes of homeopaths by publishing a series of experiments in which he claims that DNA highly diluted in water is able to generate radio signals (Montagnier 2009). There are numerous problems with these studies, however. Prime among them is that Montagnier's study design is laughably sloppy (see Myers 2011). Montagnier used a crude signal detection device hooked up to a computer and generated worthless noise-ridden results. His studies proved nothing (and, not surprisingly, have not been replicated), but that has not stopped homeopaths from seizing upon his work to claim vindication.

So we are still left with no plausibility and no evidence that water can form ultrastructures for a biologically meaningful amount of time. It is amazing that Roy, Montagnier, and others so enthusiastically extrapolated from the claim that water can hold structures slightly longer than previously believed (itself probably bogus) to the notion that this can explain the biological effectiveness of homeopathy. Let's take a close look at the nontrivial steps they glossed over.

If this kind of water "memory" is an explanation for homeopathy, then these structures would have to survive not only in a sample of water but through the physical mixing of that water with other water. In fact, they would have to transfer their structure, like a template, to surrounding water molecules. This would need to be reliably repeatable over many dilutions. Then these structures would have to survive transfer to a sugar pill (often homeopathic remedies are prepared by a drop of the water being placed onto a sugar pill).

These water structures would then have to be transferred to the sugar molecules because before long the water will evaporate. This pill will then sit on a shelf for days, months, or years before it is finally consumed by a gullible patient. The sugar pill will be broken down in the homeopathy proponent's stomach, and the sugar molecules will then be digested, absorbed into the blood stream, and distributed through the blood to the tissues of the body.

Presumably, whatever molecules are retaining this alleged ultrastructure are sticking together throughout all of these processes and finding their way to the target organ in which they are able to have their chemical/biological effect.

Absurd does not even begin to cover the leaps of logic that are being committed here. In short, invoking water memory as an explanation for homeopathic effects just adds more layers of magical thinking to the notion of homeopathy; it wouldn't offer a plausible explanation even if the theory of water memory was true, which it isn't.

Some chemical bonds are strong enough to survive this process intact and make it through the body to the target tissue where they can bind to receptors or undergo their chemical reactions. Even most chemicals, however, cannot make it through this biological gauntlet with their chemical activity intact—which is why the bioavailability of many potential drugs is too low for them to be useful as oral agents. The chemicals are simply broken down by the digestive process. In other words, the ephemeral bonds of this alleged water memory—if this fiction of water memory even existed—would have a bioavailability of zero.

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Conclusion

The notion that water has memory is nothing more than a restating of Hahnemann's superstitious notion that substances can transfer their "vital essence" to other substances. Water memory is another fiction of homeopathy; it is not based upon any science and is implausible in the extreme. ■

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[SCIENCE WATCH KENNETH W. KRAUSE

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Denisovans and Human Hybrids in the Game-Changing Age of Paleogenetics

If God created man in his own image, as the opening chapter of Genesis demands, he must have first created the carnival fun-house mirror as a reference tool. Since the ancestors of chimpanzees and modern humans split between six and eight million years ago, different species of hominin have evolved or retained bizarre muddles of seemingly strange and unlikely features—branch-grasping feet, sprawling pelvises, flared rib cages, chinless mandibles, protruding brow ridges, and, of course, expanded brains, just to name a few.

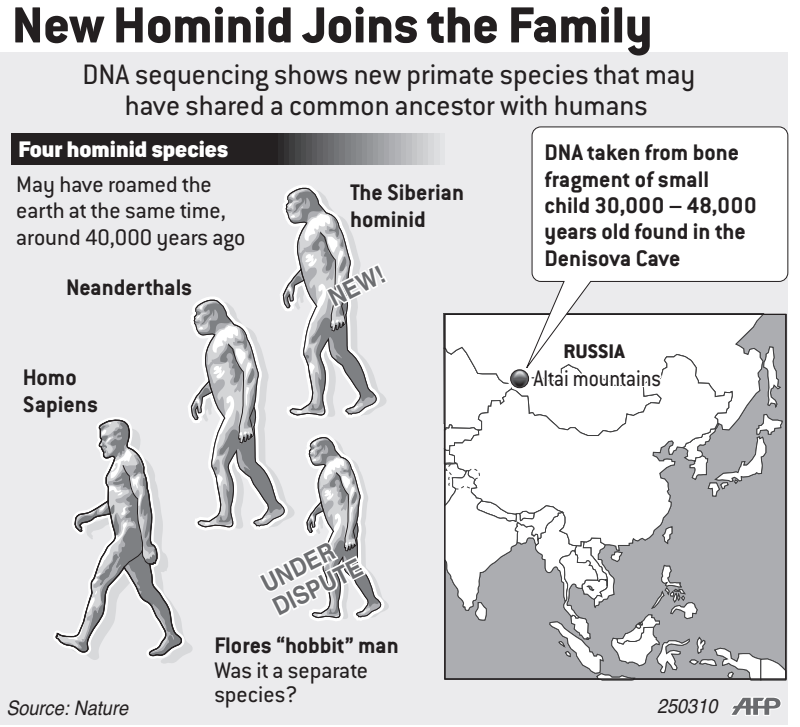
But recent discoveries have complicated the more contemporary human narrative too. When our direct ancestors—a small but well-fated population of *Homo sapiens*—emigrated from Africa into the Near East over 50,000 years ago, the Eurasian landmass had already been inhabited by a variety of humans. The Neandertals, for example, flourished in the west until about 28,000 years ago, while *Homo floresiensis* persisted in present-day Indonesia until around 17,000 years ago.

Were there others? If so, did our ancestors simply wipe them out, along with all genetic remnants of their existence? Or did they interbreed with the other humans as their numbers swiftly expanded into both Europe and Asia?

Two schools of thought have long dominated the debate. Led by Chris Stringer at the National History Museum in London, disciples of the majoritarian "complete replacement" model argue that our ancestors simply supplanted other humans, by whatever means, rather than mixing with them. Contrarily, "classic multiregionalists" tend to follow University of Michigan's Milford Wolpoff, who, with the minority, contends that modern *H. sapiens* were conceived outside of Africa through the genetic intermingling of perhaps many human groups.

But, to nearly everyone's surprise, both paradigms were challenged on May 7, 2010, when an international team of scientists led by Svante Pääbo published a draft sequence of the Neandertal genome in *Science* magazine (Green 2010; the subject of my "Science Watch" column of September/October 2010). A paleogeneticist at the Max Planck Institute in Leipzig, Germany, Pääbo revealed that 1–4 percent of the modern, non-African human genome was derived from our burly cousins. In other words, Neandertals and modern humans, whose lineages split between 440,000 and 270,000 years ago, likely interbred in the Middle East between 80,000 and 50,000 years ago.

Unfortunately, the Neandertal Genome Project largely obscured another important hominin discovery, from


New Hominid Joins the Family
DNA sequencing shows new primate species that may have shared a common ancestor with humans
Four hominid species
May have roamed the earth at the same time, around 40,000 years ago
The Siberian hominid
NEW!
Neanderthals
Homo Sapiens
UNDER DISPUTE
Flores "hobbit" man
Was it a separate species?
DNA taken from bone fragment of small child 30,000 – 48,000 years old found in the Denisova Cave
RUSSIA
Altai mountains
Source: Nature
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which two major papers eventually resulted. First, on April 8, 2010, a spare, seven-member team led by Pääbo and his Leipzig colleague Johannes Krause published its findings vis-à-vis the mitochondrial genome of an unfamiliar human recovered from a deep forest in southern Siberia (Krause 2010).

In 2008, Russian archaeologist Anatoli Derevianko—who would ultimately join the Pääbo-Krause team—found a female child's distal manual phalanx, or pinkie bone, in Denisova Cave in the Altai Mountains of present-day Russia. Although the finger couldn't be tested directly, its surrounding stratum was radiocarbon dated to between 48,000 and 30,000 years old. Reluctant to grant the child a taxonomic designation as a Linnaean species or subspecies, the team would later identify the new humans simply as the "Denisovans."

The child's mitochondrial DNA (mtDNA) proved exceptional, diverging from that of modern humans and Neandertals at 385 and 202 nucleotide positions, respectively. Indeed, this preliminary study disclosed no sign of interbreeding. But Pääbo couldn't rule it out because both *H. sapiens* and Neandertals had evidently inhabited the neighboring environs at the same time. In fact, humans had probably occupied the site beginning around 280,000 years ago.

In any case, Pääbo's soon-to-be-expanded squad immediately began working on the Denisovans' unusually well-preserved nuclear genome. At about three billion letters long, the nuclear sequence promised a much more lucid account because it consisted of countless unlinked, neutrally evolving loci. The mitochondrial genome, by contrast, is inherited maternally as one unit without recombination and is subject to genetic drift.

And so the latest, though certainly not the last, word on the Denisovans was published in *Nature* on December 23, 2010. In their genetic history of the new human specimen, Pääbo and Harvard Medical School geneticist David Reich led a veteran group of twenty-eight authors from Germany, Spain, China, Russia, Canada, and the United States (Reich 2010). Wasting no time, they reanalyzed the finger bone and another individual's tooth—a second or third upper-left molar—discovered in the same cave by Derevianko back in 2000.

Pääbo's combined results from 2010 might prove so profound as to forever transform our conceptions of recent human evolution—and thus, the relative constitution of every contemporary population. At the very least, we're left with a fascinating yet frustratingly complex web of human migrations, interactions, and colonizations following the ancestors' final exodus from Africa.

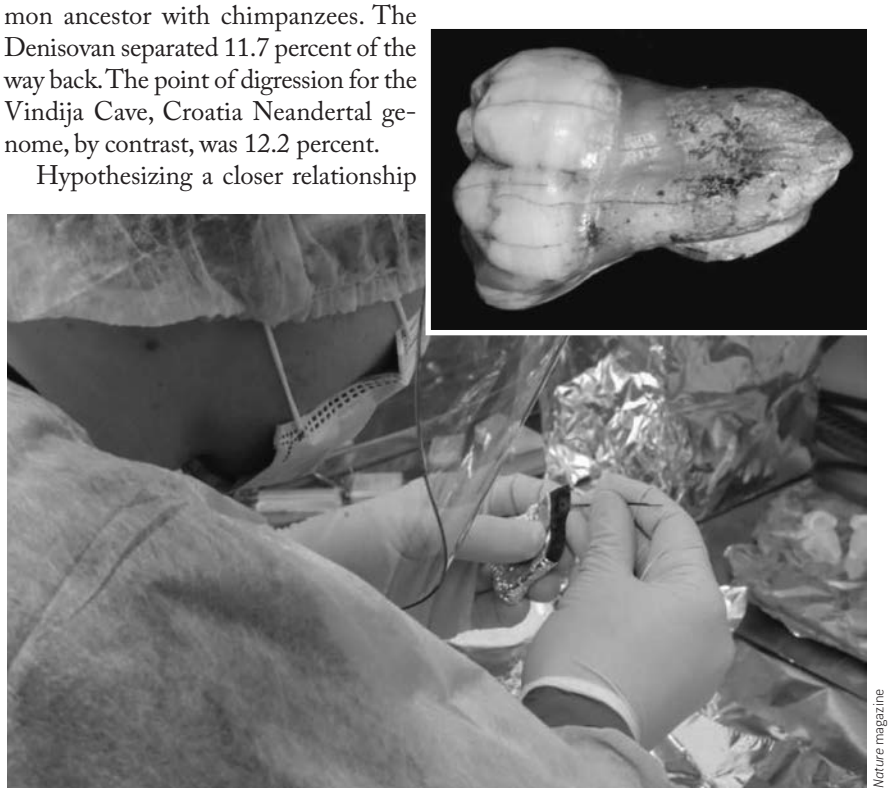
Having sequenced the Denisovan nuclear genome to 1.9-fold coverage—that is, on average, identifying sequence from nearly two DNA fragments that cover any given nucleotide base in the genome—Pääbo first explored the new hominin's relationship to both Neandertals and modern humans.

To that end, Pääbo estimated the divergence between the Denisovan and the human genome reference sequence as a fraction of the divergence between present-day *H. sapiens* and our last common ancestor with chimpanzees. The Denisovan separated 11.7 percent of the way back. The point of digression for the Vindija Cave, Croatia Neandertal genome, by contrast, was 12.2 percent.

Hypothesizing a closer relationship between Denisovans and Neandertals, Pääbo then performed a separate yet similar comparison between seven ancient and modern genomes—Denisovan, Neandertal, French, Han, Papuan, San (southern Africa), and Yoruba (West Africa). The Denisovan and Neandertal sequences separated 9.84 percent of the way back, and both of them separated from the sequences of present-day Africans 12.38 percent of the way back.

To confirm, Pääbo's team lined up the Denisovan, Neandertal, and Yoruba sequences to the chimp genome and compared derived (evolved) and ancestral alleles. They found that the Denisovan and Neandertal clustered to the exclusion of the Yoruba and chimpanzee at 46,362 sites, compared with an average of 22,012 sites for the other two possible patterns, Yoruba and Denisovan or Yoruba and Neandertal. The team's conclusion: "The Denisova individual and Neandertals share a common history since separating from the ancestors of modern humans."

So should the new humans be defined geographically and morphologically as Neandertals or as their sister



Nature magazine

A researcher extracts DNA from a fossil. Inset: The mtDNA within this tooth, found in Denisova Cave, suggests that Denisovans were distinct from both Neandertals and modern humans.

group? Pääbo et al. evaluated more Neandertal sequences to find out. After comparing the Vindija genomes to those of Neandertals from Russia, Spain, and Germany, they ascertained that Neandertals descended from a common population that experienced a drastic genetic bottleneck since diverging from the ancestors of the Denisovans. Thus, the authors resolved, "Neandertals across a broad geographical range have a population history distinct from that of the Denisova individual."

The tooth found in Denisova Cave also tended to confirm that Denisovans were distinct from both Neandertals and modern humans. For one thing, analysis of the tooth's mtDNA verified that it likely belonged to an individual from the same population as the finger. For another, its shape was odd, to say the least—of ample proportions overall, with short but robustly flaring roots.

If the tooth is a third molar, its size is consistent with Australopithecine samples and falls outside the range of normal variation in all known fossil specimens of the genus *Homo*, save *Homo habilis* and *Homo rudolfensis*. If it is a second molar, it is larger than Neandertal and early modern human samples and comparable to those from *Homo erectus* and *H. habilis* specimens. Although confident, Pääbo could not, of course, completely rule out the possibility that the tooth's primitive morphology resulted from a reversion.

Finally, the team broached the always-provocative question of gene flow—whether the new hominins might be more closely related to some present-day populations than to others. Pääbo initially examined the relationship between the Denisovan sequence and the genomes of 938 contemporary humans from 53 different populations. He found that with respect to Neandertals and Denisovans, "the Melanesian populations stand out" compared to other non-African populations.

Following up, Pääbo compared the Denisovan genome with those of twelve globally diverse persons, including additional sequences from Melanesian Papua New Guinea and Bougainville Island. In sum, the authors revealed the truly shocking news that "4.8 +/- 0.5% of the genomes of Melanesians derive from Denisovans," and, considering Pääbo's previous study of the Neandertal sequence as well, that "altogether, as much as 7.4 +/- 0.8% of the genomes of Melanesians may thus derive from recent admixture with archaic hominins."

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The most plausible explanatory model for these landmark data, according to the Reich-Pääbo team, posits the Denisovans as an archaic population genetically distinct from all others known—including their sister group, the Neandertals, with whom they split more than 200,000 years ago while inhabiting the expansive Eurasian landmass. The former migrated generally eastward as the latter broke for the west.

As our direct ancestors departed from Africa, they interbred first with Neandertals and, shortly thereafter, with Denisovans. But Denisovans probably mixed with modern humans only as their numbers expanded along Asia's southern coastal areas and into Oceania. Evidently, the ancestors of other non-African populations were unaffected by the new humans.

For now, the size and geographical range of the Denisovan group must remain unknown. Apparently, they made no genetic contribution to either the Han Chinese or the Mongolians—two populations currently residing much closer to the Altai Mountains than the Melanesians, who lived a full 10,000 kilometers away. So, whatever the Denisovans' numbers at the time of admixture, they likely left their genetic mark somewhere far south of Denisova Cave.

One wonders as well why we haven't discovered additional Denisovan remains. It may be that other fossils have been misclassified. Some specimens from China, for example, resemble neither modern humans, Neandertals, nor *H. erectus*. And even the Denisovan finger bone was originally thought to belong to a modern human. We should remember too that *H. floresiensis* wasn't discovered until 2004. Only time will tell, of course, as the search for more fossils continues.

Perhaps most rousing of all is the realization that some of us carry more archaic DNA than others. Some might argue that DNA retained for almost 50,000 years must confer a substantial advantage or at least serve some practical purpose. Accomplished paleogeneticists like Pääbo hope to provide answers to these questions and others in the very near future.

Whatever the outcomes, as the scientific picture grows ever clearer, the rest of us will no doubt be forced to cope with new realities, including unexpected forms of genetic diversity and increasingly vague conceptions of what it means to be human. ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

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Anomaly Hunting

Q: **It seems that paranormal investigation often involves people searching for unusual or possibly paranormal events. Does anomaly hunting play a role in legitimate science? Consider an astronomy grad student looking for odd phenomena to study for his or her thesis.**

—R. Esau

A: Your question is a good one, and it is especially relevant to ghost investigations. Ghost hunters often search for spirits by walking around a supposedly haunted location for hours and setting up tests (or "trigger items"), waiting for anything they consider unusual to happen.

Most amateur ghost-hunting groups (influenced by television shows like *Ghost Hunters* and *Ghost Adventures*) focus on anomaly hunting and mistake it for investigation. Historically, writer Charles Fort perhaps best personifies anomaly hunting, doing little or no actual investigation but instead scouring published clippings for anomalies and strange accounts. But reports of anomalies, absent rigorous investigation, are merely anecdotes and are not proof of the paranormal.

Anomaly hunting is a very poor investigation technique; it is not particularly useful in solving mysteries and is in fact usually counterproductive. That's because scientific paranormal investigation begins with a specific claim (e.g., "A ghost in my house throws plates at me" or "My Elvis statue is weeping blood"), which is then closely analyzed. Anomaly hunting reverses this process, essentially putting the investigator in the position of accepting possibly spurious new claims, at least as the starting point of investigation. I discussed this topic in my recent article "Ghost-Hunting Mistakes" (SI, November/December 2010).

It's the classic paranormal fallacy of arguing from ignorance (or personal incredulity): "I don't understand X, therefore it's an anomaly." We see this in everything from UFO reports to ghost and Bigfoot sightings, whereby people experience something they believe is weird and assume it's paranormal (or at least an anomaly). In science, if what you're observing contradicts known facts or the accepted body of knowledge, the first assumption should be that the experiment (or the assumptions behind it) might be flawed in some way—not that you have discovered some new phenomenon.

What about anomaly hunting in science? The example you provide, of a grad-student astronomer searching the heavens for something new, is an interesting one. Scientists, as a rule, do not spend their time searching for anomalies. Geologists don't spend their careers sampling soils around the world looking for anything unusual, and epidemiologists don't randomly screen the public hoping to find some unknown disease. Instead, they encounter anomalies in the course of their ordinary work and are usually easily able to distinguish them as such. For example, conjoined twins are an anomaly, but it would be pointless for a researcher to spend his or her time visiting hospitals around the world looking for them; instead, the anomaly will appear and *then* be investigated.

Furthermore, if the grad student in your example did want to scan the skies looking for some new phenomenon, he or she would presumably know what to look for, that is, what characteristics would make something he or she detected novel or strange. Scientists, unlike ghost hunters, have an idea of how to identify a true anomaly. Scientists educate themselves with reliable knowledge about the characteristics of what they're studying; ghost hunters cannot. Alleged ghostly phenomena are very poorly defined and include an impossibly wide variety of "signs," including cold, heat, noise, silence, fear, and so on (Radford 2010).

To see the problem that anomaly hunting poses, consider the following example: A college student reads that water freezes at thirty-two degrees Fahrenheit. Being a naturally skeptical and inquisitive fellow, he decides to try it for himself. He fills a cup with water and puts it, along with a thermometer, in a freezer and sets the freezer's temperature. The next day he opens the freezer door and finds that the water is very cold but not frozen. This information—this anomaly—contradicts widely accepted knowledge about the freezing temperature of water. The thermometer reads below thirty-two degrees, yet the water is not frozen. Science was wrong!

But before he corrects Wikipedia and sends an e-mail to the Nobel Committee notifying them of his breakthrough, he should read the fine print for a better understanding of what he was looking for.

But before he corrects Wikipedia and sends an e-mail to the Nobel Committee notifying them of his breakthrough, he should read the fine print for a better understanding of what he was looking for. *Pure* water freezes at thirty-two degrees Fahrenheit *at sea level*. If the water was not pure, the thermometer was not exact enough for scientific purposes, the experiment was not conducted at sea level, or if there was a bit of oil or another contaminant in the cup—or if any number of other factors he didn't think of were at play—then the fact that his sample remained unfrozen at thirty-two degrees is not anomalous. What he perceives as an anomaly is in fact nothing of the sort. The error is not with accepted science but with his procedures and/or understanding of the phenomenon.

Ghost hunters often go through an identical process: not understanding what they are looking for and mistaking normal variations in a room's temperature, ambient sounds, electromagnetic fields, or other measures for mysterious anomalies. The situation might be different if at least some characteristics of ghosts had been scientifically established, as this would provide some basis for characterizing a given phenomenon as either within normal variation or as anomalous. But there's little if any scientific or investigative rationale for anomaly hunting. ■

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A Skeptical Look at a Remarkable Case Report of 'Overnight' Amnesia

Extraordinary Symptoms, Weak Evidence, and a Breakdown in Peer Review

A peer-reviewed article reporting a bizarre and previously unknown form of amnesia imparts valuable scientific lessons: poorly documented case reports can confuse as well as enlighten, and we should be skeptical of clinical claims modeled after Hollywood plots. It also reminds us why scientific journals need to allow for the self-correction of questionable claims.

HARALD MERCKELBACH, THOMAS MERTEN, AND SCOTT O. LILIENFELD

Well-documented case reports have substantial value. As Davison and Lazarus (2007) note, case reports can raise useful questions about theories, provide preliminary data to be tested in more rigorous investigations, and "permit the investigation, although poorly controlled, of rare but important phenomena" (157).

Nevertheless, case reports of novel clinical phenomena have their limitations, especially when presented without adequate documentation. As Loftus and Guyer (2002) observed in an article in the SKEPTICAL INQUIRER, case studies "illuminate, but can also obscure the truth. In many cases, they are limited by what their reporter sees, and what their reporter leaves out. . . . To the scientist, therefore, most case studies are useful largely to generate hypotheses to be tested, not as answers to questions" (26).

To illustrate the problems of poorly documented case reports, we analyze a recent report by Smith et al. (2010) of a purportedly new and exceedingly strange memory disorder. This case was published in *Neuropsychologia*, one of the world's premier outlets for neuropsychological articles.

The Apparent Discovery of a Remarkable New Form of Amnesia

Smith and colleagues (2010) described an extraordinary and unique constellation of memory aberrations. Their patient—a fifty-one-year-old woman referred to as "FL"—was involved in a car accident in 2005, during which she briefly lost consciousness. FL reported that since then she accumulates memories continually during the day but then loses all of them after one night of sleep. That is, she experiences overnight amnesia, so she must start afresh with a "blank slate" when she awakens each morning. The investigators noted that FL's symptoms mimicked the scenario of the 2004 romantic comedy *50 First Dates*, in which one of the characters, Lucy (portrayed by Drew Barrymore), suffers from overnight amnesia following a car accident.

Soon after the publication of Smith et al.'s case study, a number of websites rushed to publicize it. The website Neurocritic noted that Hollywood has a long and checkered history of presenting cases of amnesia that bear no resemblance to reality, but "that isn't true anymore." The British Psychological Society's *Research Digest* reported that "psychologists have documented what they believe to be a clinical first—the case of an amnesic woman whose memory for new material is erased each night that she goes to sleep." What is notable about these and other web reports is that they were virtually all offered without even a hint of skepticism. In turn, these uncritical descriptions were picked up verbatim by numerous other websites.

The Limitations of Smith et al.'s Case Report

As we will see, all of these reports neglected to mention a crucial fact: the Smith et al. case report was marked by three major limitations.

Limitation #1: Lack of Crucial Background Information

The level of detail regarding FL's case description is unsatisfactory. The authors inform us that despite FL's severe memory impairments, "she was able to return to her previous employment after some accommodations were made at work" (Smith et al. 2010, 2834). It is difficult to imagine any job in which recollection of all information gained after a specific date (in this case, after FL's car accident) is inessential. Furthermore, the article suffers from a striking paucity of information about FL's work accommodations: did they involve lessened responsibility, fewer working hours, longer breaks, more assistance, and so on? If so, such privileges might constitute an important motive for feigning memory impairments.

As appropriately skeptical readers, we need to know to what extent FL's overnight amnesia adversely affects her everyday functioning. Nevertheless, Smith and colleagues apparently did not attempt to contact co-workers or friends to confirm that FL's presumed memory loss has affected her daily behaviors.

Still other information provided by the authors is uninformative. For example, the fact that the patient failed to recover memories of the time after the accident while under hypnosis (2834) does not offer evidence that such memories were inaccessible to her. Hypnosis, despite popular misconception, is not a dependable technique for recovering lost memories (Lynn et al. 2003).

Smith et al. mentioned in passing FL's involvement with the legal system following her accident. Nevertheless, they do not provide adequate details concerning this involvement. For example, did FL file a personal-injury claim? Research shows that a litigation context is associated with symptom exaggeration and misrepresentation (Faust 1996; Tolin et al. 2004). Indeed, Iverson (2005) found that patients involved in litigation display substantially lower neuropsychological performance (that is, lower scores on standardized measures of memory, attention, and problem-solving) than comparable patients who are not. This pattern suggests that their scores on neuropsychological tests may partly reflect attempts to persuade others (such as attorneys and jurors) that they deserve financial compensation.

Columbia Pictures/Michaels, Darren/Album/Newscom

50 First Dates depicts a case of "overnight" amnesia that has no basis in science.

Limitation #2: Failure to Exclude Feigning or Inadequate Motivation

A second limitation of Smith et al.'s case report is their failure to rule out feigning or a lack of motivation to remember new material (see Carone et al. 2010). In their case description, Smith and colleagues dismissed the possibility of feigning by arguing that "it was the impression of those who worked with FL that she believed that she had the memory impairment that she described" (Smith et al. 2010, 2839). Yet this reassurance is unsatisfying because subjective clinical impressions alone are known to be grossly insufficient for detecting the feigning of disorders (Rosen and Phillips 2004).

Smith et al. administered several memory tests to FL as well as to healthy participants who were instructed to simulate overnight amnesia. In many respects, the performances of the simulators paralleled that of FL, which should give us pause when interpreting the claim that her amnesia is genuine. The authors also administered several memory tasks that involved tests of learned materials following a delay of twenty-four hours. When they tested FL's delayed memory covertly—in a way that was not transparent to her—there were clear indications that despite her purported memory difficulties, FL could reproduce material that was presented on the previous day. This performance pattern flies in the face of the overnight amnesia syndrome attributed to FL.

To their credit, Smith et al. did administer Warrington's (1984) "Recognition Memory Test for Words and Faces" to FL. She obtained a score of 41 on the immediate recognition test; using a cutoff score ascertained in a recent study (Kim et al. 2010), this low score provides preliminary evidence that FL exerted low levels of effort on the neuropsychological tests she was administered. Nevertheless, the authors of her case description apparently overlooked this worrisome indication.

Limitation #3: Lack of Connectivity with the Scientific Literature

Absence of connectivity (Stanovich 2009), a key indicator of questionable science, occurs when investigators neglect the existing corpus of scientific knowledge. Indeed, from both scientific and

theoretical perspectives, Smith et al.'s case description is puzzling. There is no known mechanism whereby memories can be acquired during the course of a day only to be wiped clean after a night's sleep. Moreover, an abundance of literature demonstrates that certain sleep stages promote memory consolidation, whereas sleep deprivation impedes it (Walker and Van der Helm 2009). Yet Smith et al. inform readers that following a sleep-deprivation protocol, FL's amnesic deficit somehow disappeared and that "her husband reported that she awakens 3.5 h into each night's sleep and has been able to retain her memory for successive days with this regimen" (Smith et al. 2010, 2834).

The authors' sleep-deprivation protocol could have afforded them a powerful tool to falsify their hypothesis. What would have happened if the treatment team allowed FL to sleep for only three-and-a-half hours or less but informed her that she had slept for six hours or more? If FL had continued to claim a lack of memories despite sleeping for only three-and-a-half hours or less, this finding would have pointed strongly in the direction of a persistent belief in amnesia in its absence or feigning amnesia rather than amnesia per se.

Hollywood and Amnesia

As we have already noted, FL's memory loss is suspiciously similar to that of Drew Barrymore's character in the film *50 First Dates*. Interestingly, FL saw the movie several times after her accident, and she reported that Drew Barrymore was her favorite actress. Smith et al. acknowledged that FL's multiple viewings of the film may well have shaped her beliefs about memory and, in turn, her amnesic symptoms. In the authors' words: "The idea that memories can disappear overnight became popularized by a fictional film and may have influenced FL's concept of how memory could fail after a car accident" (Smith et al. 2010, 2839).

Thus, according to Smith and colleagues, FL's amnesia may reflect her *belief* that a person can lose all newly acquired memories after a night of sleep. This belief, in turn, may explain the paradox of FL's reporting that she loses all of her memories overnight co-existing with her ability to retain the previous day's knowledge when demonstrated on covert testing.

This analysis is logically confused. The term *amnesia* indicates a condition that can be objectively documented and goes beyond a mere *belief* patients hold about their memories (see Read and Lindsay 2000). If FL only *believes* that she suffers from a memory impairment, and her memory actually functions largely within the normal range, her condition would more accurately be described as pseudo-amnesia, not amnesia.

Baxendale (2004) noted that the overwhelming majority of films that portray amnesia do so in a grossly inaccurate fashion—with the 2000 film *Memento* being a noteworthy exception (see also Lilienfeld et al. 2010). For example, many films depict people with amnesia following brain trauma as having no recollection whatsoever of their identity or past, when in fact such complete loss is exceedingly rare. Other films erroneously depict people who develop amnesia as acquiring remarkable—even superhuman—powers, including extrasensory perception and other paranormal abilities. Ironically, Baxendale singled out *50 First Dates* as an especially egregious example of Hollywood's unscientific portrayal of memory loss, observing that this film "maintains a venerable movie tradition of portraying an amnesic syndrome that bears no relation to any known neurological or psychiatric condition" (Baxendale 2004, 1480).

Avoiding Erroneous Conclusions in Case Reports: Thinking Bayesian

Truzzi's (1976, 1978) and Sagan's (1995) maxim that extraordinary claims require extraordinary evidence makes good sense from a Bayesian standpoint, a statistical and conceptual approach that takes *a priori* plausibility into account when evaluating the likelihood of claims. The base rate (prevalence) of extraordinary phenomena is by definition extremely low (Atwood 2008; Goodman 1999). If a memory disorder like overnight amnesia exists, its prevalence is surely tiny relative to that of feigning, especially when real-world privileges or judicial outcomes are potentially at stake. As a consequence, the evidence needed to conclude that such a syndrome is present should be overwhelming. As medical students learn, "When you hear hoofbeats, think horses, not zebras," an

If FL only *believes* that she suffers from a memory impairment, and her memory actually functions largely within the normal range, her condition would more accurately be described as pseudo-amnesia, not amnesia.

admonition to "think Bayesian" when evaluating the likelihood of diagnostic possibilities (Groopman 2007).

Wedding and Faust (1989) advised neuropsychologists to "not become overly focused on the esoteric" (258) and noted that clinicians' preoccupation with uncommon features is an obstacle to sound clinical judgment. In the case of FL, the scientific guideline of Occam's razor urges us to assign much higher probability to alternative explanations for her amnesia than to overnight amnesia.

Three Scientific Lessons Imparted by the Smith et al. Case Report

Lesson 1: Welcome the Publication of Case Reports, but Insist on Adequate Documentation

The case report of FL is certainly intriguing. If the existence of an entirely new form of amnesia in her case were to be confirmed, it would not only herald the discovery of a new disorder but challenge existing models of memory loss. Nevertheless, it is difficult to justify the publication of Smith et al.'s report in its present form given the absence of crucial details and failure to rule out plausible rival hypotheses for FL's symptoms. As a general rule, journals should insist on high standards of objective documentation when publishing case reports of rare or unusual phenomena. If such documentation is unavailable, it is at the very least incumbent on authors to be circumspect in their conclusions.

Lesson 2: Widely Viewed Television Programs and Films May Influence the Presentation of Patients' Symptoms

Psychologists and psychiatrists have long recognized that certain disorders are partly iatrogenic in origin: that is, they can be inadvertently induced by well-meaning, but mistaken, psychological or medical treatment (Lilienfeld 2007). The case of FL reminds us, however, that in today's media-driven world, some disorders may be what we term telegenic in origin: induced at least partly by television, films, and news and entertainment media.

Dissociative identity disorder (DID), formerly called multiple personality disorder, is a likely case in point of a telegenic disorder (see Byrne 2001). Prior to 1970, there were fewer than 80 such cases reported in the world literature. Nevertheless, following the 1976 made-for-television film *Sybil* that starred Sally Field, who portrayed a real-life woman with a history of severe child abuse who supposedly possessed sixteen personalities (but see Rieber et al. 2002 for data calling the Sybil case into question), the number of DID cases skyrocketed into the thousands (Boor 1982). Although this finding does not prove that *Sybil* triggered the dramatic increase in DID cases, there are good circumstantial reasons to believe that the film played at least some causal role. For example, prior to *Sybil*, remarkably few individuals with DID reported a history of child abuse; following *Sybil*, the overwhelming majority did (Spanos 1996). Moreover, although most cases of DID prior to *Sybil* reported only one or two alter personalities, the mean number of DID cases in post-*Sybil* reports was much higher—in one study it was sixteen, precisely the number reported by Sybil (Ross et al. 1989).

Clinicians who work with individuals who report disturbances in memory and identity must therefore be cognizant of the possibility that their patients' symptoms can be shaped by Hollywood depictions (Baxendale 2004). Because many of these portrayals are wildly inaccurate from a scientific standpoint, clinicians may be duped into accepting telegenically induced symptoms—which are merely modeled after Hollywood depictions—as reflecting entirely "new" disorders.

If the existence of an entirely new form of amnesia in [FL's] case were to be confirmed, it would not only herald the discovery of a new disorder but challenge existing models of memory loss.

Lesson 3: Permit Researchers to Submit Critiques of Case Reports in the Peer-Reviewed Literature

Editors and reviewers play crucial gatekeeper roles in evaluating whether case reports of patients displaying spectacular symptoms 1) provide sufficient detail, 2) rule out alternative explanations, 3) build on existing scientific findings and theories, and 4) refrain from launching premature diagnostic entities. Nevertheless, if journal editors elect to accept case reports even when they are suboptimal in one or more of these respects, they must at the very least afford critics the opportunity to articulate the shortcomings of those reports.

Remarkably, the journal that published the Smith et al. case, *Neuropsychologia*, does not accept commentaries on its case reports (or other empirical articles) and refused to even consider a rebuttal of Smith et al.'s case report for publication. Compounding the problem, several other journals (perhaps understandably) refused to consider publishing a commentary on the Smith et al.

case report on the grounds that it had appeared in a different journal.

Neuropsychologia's misguided editorial policy deprives science of one of its most valuable safeguards: self-correction (see Beyerstein 1995). When journals do not allow authors to submit critiques of case reports, they short-circuit the essential role of the peer scientific community in scrutinizing remarkable claims. In turn, they may permit questionable information to make its way into the peer-reviewed and popular literatures, allowing dubious conclusions to be disseminated with minimal qualification. The result, we suspect, is often little more than scientific obfuscation.

Postscript: Another Case of Telegenic Amnestic Syndrome?

Soon after we completed the initial draft of this article, co-author Thomas Merten saw a patient in a hospital's neurology ward: a twenty-three-year-old male found by his girlfriend in the bathroom following a brief period of reported unconsciousness the previous week. He claimed not to recognize her or anyone else and to have no recollection of his identity. Oddly, he exhibited neither signs of marked brain damage on neuroimaging nor any neurological or neuropsychological symptoms on standardized testing. Yet the man reported that he had lost all memories, plus all of his learned abilities, such as knowing how to open a can. At the conclusion of the interview, he reported that during his previous weekend at home he had watched the movie *50 First Dates* with his girlfriend. She informed him they had seen it several times in the past, but he claimed to have no memory of it.

If our speculations about "telegenic amnestic syndrome" are correct, this postscript may end up being merely the pilot episode of a host of others to follow. As they say in the television world, stay tuned. ■

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Power Lines and Cancer, Distant Healing and Health Care

Magnetism Misrepresented and Misunderstood

The 1990s fear that background magnetic fields—hundreds of times weaker than Earth's magnetic field—could cause cancer has been replaced. Twenty years later, advertisements by licensed hospitals claim that humans can be trained to emit and manipulate these same energies to initiate healing.

EUGENIE V. MIELCZAREK and DEREK C. ARAUJO[1]

In the early 1990s, the *New Yorker* magazine published three articles by Paul Brodeur describing claims that background radiation from nearby power lines caused an outbreak of leukemia in children living in Denver, Colorado (Brodeur 1990a, 1990b, 1992).

In 2008, the *Journal of Orthopaedic Research* published a claim that therapeutic touch[2] (TT) practitioners at the University of Connecticut Health Center were able to diminish the growth of human osteosarcoma (cancer) cells by using their hands to manipulate energy fields surrounding the cells (Jhaveri et al. 2008). The cell cultures over which the practitioners' hands were placed were located in L-shaped rooms, implying that some undefined radiation pattern would not turn corners. That paper's corresponding author is Gloria Gronowicz, professor of surgery at the University of Connecticut Health Care Center.

Ironically, the reasoning behind both of these claims was based on the presence of a magnetic field of about two milligauss. The source of the "harmful" two-milligauss field that allegedly caused the leukemia outbreak in Colorado was background radiation from power lines (Hafemeister 1996; Brodeur 1993). The "healing" field emitted from the hands of humans at the University of Connecticut was also alleged to be about two milligauss. But there was no indication that the building in which the experiments were conducted was shielded from background electromagnetic radiation.

Both claims concerning the effects of low-level magnetic fields were widely influential. Brodeur's publications provoked a widespread fear of living near power lines, which became such a powerful urban legend that in 1991 Congress asked the National Academy of Sciences (NAS) to prepare a report on the issue. *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields* was published by the NAS's Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems et al. in 1997.

Eleven years later, Jhaveri and coworkers' *Journal of Orthopaedic Research* article concluded with the statement that "therapeutic touch … increased the growth of normal bone cells in culture dishes, but decreased the growth of bone cancer cells" (2008). References to the paper and quotes from it appeared on the websites of wellness clinics offering services in distant healing (also called TT, Reiki, or qigong). References to this and other publications by Gronowicz also appeared on the website of chiropractor Lynn Karew, who practices in Santa Monica, California: "We see that human touch has the capacity to affect even cell growth and thereby has a real healing potential. . . . The findings also give hope to many patients who suffer from abnormal cell growth—in particular cancer patients. By and large, energy medicine treatments, in particular therapeutic touch (TT), promise significant benefits for our bodies" (Karew, n.d.).

In a July 2008 interview, *Hartford Courant* reporter Hilary Waldman asked Gronowicz, "Should somebody with osteoporosis or a broken leg go to their Reiki practitioner?" Gronowicz replied, "We don't know" (Waldman 2008).

"Harmful" Magnetic Fields

By the early 1990s, the international community's panicked reaction to alleged harmful fields emanating from power lines reached such frenzied proportions that some communities sued to have power companies shield the lines and bury them (Thomley 1998; Hafemeister 1996; Committee et al. 1997). Opportunistic vendors peddled monitors of outdoor radiation exposure to worried citizens, and "some city regulations sought to constrain B fields [i.e., magnetic fields] to less than 2 milligauss" (Hafemeister 1996).

Yet scientific studies repeatedly de-

monstrated that concerns about the effect of extremely weak magnetic fields on human biology are unfounded. The final NAS report examining the potential health hazards of power lines presented a comprehensive study of the alleged dangers. Supporting documentation about background radiation from power lines included measurements by engineers, calculations by scientists, and a critique of epidemiological claims. After a detailed examination of the evidence, the NAS concluded that there is no credible basis for believing that two-milligauss fields are biologically harmful.

The report's findings were grounded in multiple sources of corroborative evidence. In addition to a lack of confidence in the epidemiological studies, the notion that two-milligauss fields are harmful to cellular biology contradicts the most fundamental laws of physics, including the second law of thermodynamics—from which one calculates the thermal-noise level of a cell—and the laws that govern our understanding and use of electromagnetic radiation. Based on these laws, detailed calculations of the effect of extremely low-level magnetic fields on human cells were published in a series of articles by Robert Adair (Adair 1991, 1992, 1998) and William Bennett (Bennett 1994). The calculations demonstrated that any impact of such low-level fields would be trivial in comparison to the effects of background fields that naturally occur within human cells. For example: imagine yourself, reduced to the size of a molecule, sitting inside a cell. Here you will view electric charges colliding with molecules, creating fluctuations in the electric field. These fluctuations will produce thermal noise with the energy of about eight orders of magnitude, 10^8, greater than the energy associated with the external background electric field.

The NAS report concluded that there are no accepted theoretical mechanisms for affecting biological processes operating at magnetic fields of such a low level. "Thus even the most subtle of any field driven biological processes must arise from fields that are many orders of magnitude larger than even the fields used in MRI imaging." Table 1 compares the energies of the magnetic fields produced by a variety of sources, including Earth's magnetic field, fields occurring in the background environment, and fields produced by magnetic resonance imaging (MRI) equipment. The allegedly harmful fields produced by power lines are multiple orders of magnitude weaker than each of these fields.

Thus, the NAS report ruled out carcinogenic effects of living under power lines because thermal-noise fields are far larger than the background fields from power lines. No adverse health effects could be attributed to these low-level fields. Any biological mechanisms that would initiate cancer must start at the cellular level, and these mechanisms can operate only within the laws of physics. The politically driven fears of carcinogenic mechanisms arising from low-level magnetic fields lost all scientific credibility.

Table 1. Comparison of Energies Associated with the Living State

Thermal noise level	A human cell	1 kT*
Light	A photon of green light	120 kT
Biochemistry	Oxidation of a glucose molecule	1,159 kT
Alleged "healing" magnetic field	2 milligauss at molecular scale	10^{-15} kT

*1 kT = Boltzmann's constant × nominal body temperature = 0.025 electron volt (eV)

"Healing" Magnetic Fields

In contrast to the *New Yorker* articles that instigated fears about harmful magnetic fields, corresponding author Gronowicz's (Jhaveri et al. 2008) research on the alleged healing fields produced by TT practitioners appeared to build upon previous scientific studies. Gronowicz's research citations for healing fields rest on a paper by John Zimmerman (1999), "Laying-on-of-Hands and Therapeutic Touch: A Testable Theory," in the *Journal of the Bio-Electro-Magnetics Institute* (*BEMI*). Repeated attempts to locate this paper and the journal in which it appeared, however, have proved futile.[3]

Although citations of the Zimmerman paper appear in a number of articles on distant healing, the paper itself appears to have vanished. Gronowicz's (Jhaveri et al. 2008) research had been funded by the National Institutes of Health's (NIH) National Center for Complementary and Alternative Medicine (NCCAM). It was therefore unsurprising that the Zimmerman paper was also cited on the NCCAM informational website in their overview on energy medicine. Librarians at neither George Mason University nor the NIH, however, were able to locate the journal. A web search for its author, John Zimmerman, a sleep psychologist, led to the reference "Earthing and Earth Fx Products: A Summary of Research and Development 2/10/06" and a citation of an article published in the *Brain/Mind Bulletin* on September 30, 1985 (volume 10, issue 2). The Earth Fx Products websites (Earthing 2006a, 2006b) advertise a "research company focused on the development of the health sciences and products for biological grounding."

The librarians' quest was fruitless in finding the *BEMI* journal, but it turned up a footnote in the January 1997 *Journal of Bodywork and Movement Therapies* that directed readers to contact Zimmerman directly for his article on TT. It appears Zimmerman's paper was privately published but somehow found

its way into citations within complementary and alternative medicine (CAM) journals. In an effort to locate Zimmermann, one of this article's authors (Eugenie Mielczarek) contacted Zimmermann's colleagues at his last professional address, but they were not able to confirm his whereabouts.

The legend of the salubrious effects of biomagnetic fields finds its source in Dolores Krieger, a nurse who was inspired by a nun who claimed that her healing properties depended on manipulating the energy field surrounding the body with a set of specialized hand movements (Kreiger 1975). This energy field arises from natural processes such as blood flow and electrical activity of the heart, and it measures about 0.004 milligauss (Hobbie and Roth 2007). A field of this strength is incredibly weak: three orders of magnitude less than background radiation, four orders of magnitude less than environmental background radiation, and an incredible eight orders of magnitude less than Earth's magnetic field (see table 2).

Krieger's sensational claim was amplified by the nursing community after she described touch as the "imprimatur of nursing" in her original article on TT (Krieger 1975). In the American nursing community, distant-healing protocols such as TT, Reiki, and qigong are based on a set of hand motions performed above the patient's body that supposedly release positive healing energy. A video showing these motions being used in the emergency room of the University of Maryland Baltimore Shock Trauma Center can be seen on the web (Donnell 2010).

Curiously, "negative energy" is never defined, leaving unanswered the question, "What happens if the proscribed liturgy for healing is not followed or errors are made?" Jack Hitt, a journalist writing in the *New York Times Magazine* (2009), partly answered this question. Hitt describes the distant-healing culture in Serbia. Serbian protocol for distant healing can include props, such as antennas that can allegedly be tuned to help or harm at social distances. At least within the Serbian distant-healing culture, then, it is thought that the allegedly healing magnetic field may also be used to cause harm.

The scientific community has paid scant attention to Krieger's claims. She was awarded an Ig Nobel Prize (the quasi-parody award) in 1998 (Improbable Research, n.d.). Until publication in the *Journal of Orthopaedic Research*, a peer-reviewed medical journal, claims for the success of this protocol were limited to CAM journals. Thus, claims for distant healing initiated by fields emitted from the hands of TT practitioners largely flew under the radar of the physics community.

Table 2. Common Magnetic-Field Values

Field generated by human body	0.004 (range) milligauss*
Alleged harmful fields produced by power lines	2–4 milligauss
Alleged healing field produced by TT practitioners	2–4 milligauss
Environmental background	20–1,000 milligauss
Human walking in Earth's magnetic field	40 milligauss
Earth's magnetic field	500 milligauss
Commercial alleged "healing" magnets	300,000 milligauss
MRI medical image	200,000,000 milligauss

*One milligauss equals one thousandth of a gauss.
MRI, magnetic resonance imaging; TT, therapeutic touch.

"Healing" Magnets Meet the NIH

As the debate over the harmful effects of the magnetic fields surrounding power lines was winding down, science reporters at major newspapers (Brody 2000) were popularizing claims—of physicians writing in the medical literature—of magnetic relief of joint pain and neurologic symptoms (Vallbonna and Richards 1999). Small 300-gauss magnets began to appear on the shelves of drug stores. Mattress pads equipped with magnets were being marketed. A grant awarded by NCCAM resulted in a publication in a CAM journal touting the benefits of healing magnets (Alfano et al. 2001). The study of the power lines was forgotten; magically, the low-field magnets were marketed as curative. Purveyors of the products advertise on the web to this day.

Some purveyors' rationales for the magnetic-therapy claims were ludicrous. Eugenie Mielczarek, one of the authors of this article, attended one sales pitch in which the sellers claimed their mattress magnets were superior because they incorporated only north poles. Sadly, during this time, friends who were recovering from breast cancer consulted her—hoping for confirmation that their magnetic bracelets would relieve the buildup of postoperative fluid in their breasts and underarms. Mielczarek's podiatrist seriously asked her if wearing magnetic shoe inserts would improve his golf game, and a friend with diabetes attended a hospital clinic in Pennsylvania at which a purveyor of healing magnets was a speaker. In 2007, a lawsuit against advertisers of these products, brought by the National Council Against Health Fraud, was successfully settled. Mielczarek was one of the persons who agreed to appear as an expert witness if needed. The Federal Trade Commission also threatened to prosecute purveyors who claimed healthful benefits of these products.

The NIH's NCCAM lends a false air of respectability to CAM protocols. NCCAM's influence has penetrated

the medical education system, lending false respectability to "integrative medicine" courses in medical curricula and programs at hospitals and clinics at esteemed medical institutions.[4] Donald Marcus and Laurence McCullough (2009), professors of bioethics and medicine at Baylor College of Medicine, evaluated the CAM education grants awarded by the NIH to schools of medicine. They concluded that "these . . . curricula . . . fail to meet the generally accepted standards of evidence-based medicine. By tolerating this situation, health professions schools are not meeting their educational and ethical obligations to learners, patients, or society" (Marcus and McCullough 2009).

In addition, NCCAM's promotion of questionable CAM extends beyond the medical community to the public at large. NCCAM maintains a website meant to inform the public about the validity of CAM treatments. The website leaves the mistaken impression that biochemistry and biological physics are undeveloped fields of inquiry. Misleading qualifiers are used to maintain a false level of uncertainty regarding the legitimacy of disproven treatments and techniques. For example, the NCCAM website tutorial "Magnets for Pain" (NCCAM, n.d.) states that "mechanisms by which magnets might affect the human body are not yet known"; "scientific researchers and magnet manufacturers propose that magnets might work by . . . changing nerve cell functions, balanc[ing] cell death and growth, increas[ing] blood flow and delivery of oxygen, and increas[ing] the temperature of the body." Nowhere in NCCAM's (n.d.) "Backgrounder: Reiki; An Introduction" tutorial is there any mention of the scientific calculations that settled the controversy over "damaging" magnetic fields emitted from power lines. Nor is there any mention that the chemical reactions responsible for these changes in nerve-cell functions, balances in cell populations, and increases in blood flow cannot be initiated by magnetic fields of 300 to 5,000 gauss. Sadly and frustratingly, the publications and well-established conclusions of scientists are ignored.

Is this true ignorance or mere pretense? Does the glaring omission of a large body of highly relevant scientific information reflect true ignorance on the part of the NIH, or does it reflect the political influence of alternative-medicine purveyors and their allies, who seek to maintain government funding for mythological, non-science-based protocols through NCCAM?

Mielczarek's podiatrist seriously asked her if wearing magnetic shoe inserts would improve his golf game, and a friend with diabetes attended a hospital clinic in Pennsylvania at which a purveyor of healing magnets was a speaker.

The Future of U.S. Medicine

If it is true ignorance that drives NCCAM's disregard for relevant scientific research, then our medical structure is in serious disarray. If the director of the NIH and the secretary of Health and Human Services cannot recognize this ignorance, the foundations of the nation's health care system and its fiscal integrity are under threat. Over the past decade, the U.S. government has wasted billions of dollars examining non-evidence-based treatments that have no grounding in the scientific method or in our understanding of basic scientific facts. The rise in government spending on junk medical science was largely brought about through the efforts of Senator Tom Harkin of Iowa. As the Senate's most devoted champion of CAM, Harkin helped dramatically increase NCCAM's annual budget (Atwood 2003), which now stands at a staggering $128.8 million. Most recently, Senator Harkin secured still more government funding perpetuating CAM by introducing language in health care reform legislation requiring insurers to cover any state-licensed health care providers—including CAM practitioners. A version of Senator Harkin's provision prohibiting "discrimination" against any state-licensed practitioners survived in the Patient Protection and Affordable Health Care Act (2010) that President Obama signed into law on March 23, 2010.

If the scientific and fiscal integrity of our health care system is to be salvaged, this ill-advised course must be reversed. Federal funding of NCCAM and of CAM practitioners under the health care reform act should be redirected toward proven and effective medical treatments and techniques. State governments face an urgent challenge in attempting to make quality health care available to those who need it, while simultaneously reining in the ballooning cost of medical care. To squander our scarce resources on alleged treatments that have no basis in scientific knowledge or experience is an act of gross irresponsibility. Our politi-

cal leaders owe it to the scientific community, to health care consumers, and to taxpayers to ensure that all government-funded health care is grounded in science-based medical treatment. ■

Acknowledgements

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Notes

1. Recent publications relating to this subject by the authors include:

Eugenie Mielczarek. 2010. Magnetic fields, health care, alternative medicine and physics. *Forum on Physics and Society Newsletter* (April). Available online at www.aps.org/units/fps/newsletters/201004/index.cfm.

Eugenie Mielczarek and Derek Araujo. 2009. A fracture in our health care: Paying for non-evidence based medicine (September 28). Available online at www.centerforinquiry.net/uploads/attachments/A_Fracture_in_our_Health_Care Paying_for_Non-Evidence_Based_Medicine.pdf.

Eugenie Mielczarek. Fields, alternative medicine and physics. Available online at www.sciencebasedmedicine.org/?cat=11.

2. Previous articles examining TT include:

Robert Glickman and Ed J. Gracely. 1998. Therapeutic touch: Investigation of a practitioner. *The Scientific Review of Alternative Medicine* 2(1): 43–47.

Bela Scheiber. 1997. Therapeutic touch: Evaluating the 'growing body of evidence' claim. *The Scientific Review of Alternative Medicine* 1(1): 13–15.

George Ulett. 1997. Therapeutic touch: Tracing back to Mesmer. *The Scientific Review of Alternative Medicine* 1(1): 16–18.

3. In private communication with Harriet Hall, MD, (Hall 2009), the authors discovered that Hall's similar efforts to locate the *BEMI* paper by Zimmermann also failed.

4. Examples of institutions that give false respectability to integrative medicine courses:

Brigham and Women's Hospital (affiliated with Harvard University). www.brighamandwomens.org/Departments_and_Services/medicine/Services/oshercenter

Cleveland Clinic Wellness Institute. http://my.clevelandclinic.org/departments/integrativemedicine/default.aspx

Scripps Institute. www.scripps.org/services/integrative-medicine

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Slaying the Vampire

Solving the *Chupacabra* Mystery

The mysterious vampire beast *el chupacabra* is said to have terrorized people around the world since at least 1995. A five-year skeptical investigation reveals the surprising origin of this monster, finding that there's more to this vampire than meets the eye.

BENJAMIN RADFORD

Bigfoot, the mysterious creature said to roam the North American wilderness, is named after what it leaves behind: big footprints. Bigfoot's Hispanic cousin, *el chupacabra*, is also known for what it leaves behind: dead animals mysteriously drained of blood. Goats are said to be its favorite prey (*chupacabra* means *goat sucker* in Spanish), and it is the world's third best-known mystery creature (after Bigfoot and the Loch Ness monster).

El chupacabra first appeared in 1995 after Madelyne Tolentino, an eyewitness in Puerto Rico, provided a detailed description of the bloodsucker. It had a heyday of about five years, during which sightings were widely reported in Mexico, Chile, Nicaragua, Spain, Argentina, and Florida, among other places. By 2002 *el chupacabra* was known worldwide. As one writer noted, "Not since the advent of crop circles has a strange phenomenon been so quickly assimilated into popular culture…. Chupacabras is now equal to the Loch Ness monster or Bigfoot as a cultural icon" ("Chupacabras" 2002).

Though *el chupacabra* is well known, it has been the subject of little serious or skeptical investigation. Researcher Karl Shuker (2009) lamented the "immense confusion and contradiction" surrounding *el chupacabra*, making it "almost impossible to distinguish fact from fiction, and reality from hearsay and local lore" about the creature. Having done many cryptozoological investigations—both alone and with CSI Senior Research Fellow Joe Nickell (himself author of the new book *Tracking the Man-Beasts*)—I took Shuker's statement as a challenge to see if I could be the first to definitively solve the *chupacabra* mystery.

The Investigation Begins

The first step was finding out what, exactly, people believed *el chupacabra* to be. Tolentino said the beast she saw had dark eyes that went up the temples and spread around the sides; it was a biped approximately four-feet tall that had thin arms and legs with three fingers or toes at the end of each (Corrales 1997). It had no ears or nose but instead two small airholes and long spikes down its back (see figure 1). When the beast was later reported in other countries, it took on a very different form (see figure 2). A few were found dead (for example, in Nicaragua and Texas), and the carcasses turned out to be small four-legged animals from the *Canidae* family (such as dogs and coyotes).

The next step was identifying and analyzing the central claims about *el chupacabra*: Where did *el chupacabra* originate, and why did it suddenly appear in 1995? Why was the original Puerto Rican *chupacabra* sighting so different from the later canid chupacabras? And what killed the victims of the suspected *chupacabra* attacks?

Over the course of about five years of research I answered most of these questions. For example, the question of what mysteriously drained the blood from livestock was answered decades ago in the context of cattle mutilations (in fact in the pages of SKEPTICAL INQUIRER; see, for example, Stewart 1977). The processes of natural body decay and ordinary predation can mimic mysterious

"vampiric" blood loss and mutilation to the untrained observer's eye. Furthermore, very few of the "completely bloodless" *chupacabra* victims had actually been examined. I consulted forensic and veterinary resources and interviewed a forensic pathologist who confirmed that blood loss is impossible to verify without conducting a professional necropsy (Geberth 1996, Cunliffe 2009).

Through researching original sources and accounts it also became clear why the Puerto Rican *chupacabra* was so different from later incarnations: eyewitnesses saw wildly different things and (confusingly) referred to all of them as *el chupacabra*. Recognizing that the goatsucker has a strong cultural aspect (for example, it is almost exclusively seen in Spanish-speaking countries and regions), I researched Latin America's Hispanic and Puerto Rican vampire folklore. This helped me understand the cultural background and social environment from which *el chupacabra* emerged.

Figure 1. In Latin America, *el chupacabra* is thought to be a biped with long spikes down its back.

Figure 2. A second type of *chupacabra* in canid form, reported mostly in Texas since the mid-2000s. This animal was found in Blanco, Texas. Photo by Jerry Ayer.

By paying close attention to news stories about the monster, I was able to track down each new sighting and report on it immediately after it occurred. In the case of the most famous beast, the "Cuero chupacabra," I flew to San Antonio, Texas, for the television show *MonsterQuest* to examine the beast. I spent about a week interviewing the *chupacabra*'s owner, Phylis Canion, and examining the carcass (see figure 3).

In 2008 I also conducted a field expedition in search of *el chupacabra* in the jungles of Nicaragua, near the San Juan river on the border of Costa Rica (see figure 5). Two colleagues and I searched the remote rainforest for several days and hired an expert tracker to seek any evidence of the beast (for more, see Radford 2010).

The Missing Piece of the Puzzle

By 2009 I had answered nearly all of the central questions about *el chupacabra*. But one key mystery remained: Why did the goat sucker suddenly appear in 1995? No other animals in the world are claimed to have so recently (and spontaneously) appeared; even Bigfoot and Nessie are claimed to have existed since long ago (though evidence for this is dubious; see Radford and Nickell 2007). Real creatures simply do not appear out of thin air.

The monster's origin had been an impenetrable mystery for nearly fifteen years; I felt that without answering this question I'd never be able to put forth a complete explanation. I traveled to Puerto Rico and interviewed Madelyne Tolentino, whose description of *el chupacabra* is the most important on record,

not only because of its remarkable detail but also because it is the "original" eyewitness description upon which most images of the creature are based. I interviewed her (and her ex-husband) at length, and she showed me where her sighting occurred.

Tolentino claims to have seen the creature near the street outside her house in rural Puerto Rico during the second week of August 1995 (see figure 6). Her account appears in Scott Corrales's book *Chupacabras and Other Mysteries* (Corrales 1997), and it's clear that her story is riddled with implausible observations, contradictions, and inconsistencies. This revelation spelled real trouble for *el chupacabra*. If Tolentino's account, arguably the most important eyewitness account, is not credible, her description—and much of the information that followed it—is irrefutably tainted.

Whether or not *el chupacabra* is entirely a product of culture can be debated, but the monster's strong pop-culture element is undeniable. I searched for something—*anything*—that might have appeared in Puerto Rico around the time of the first *el chupacabra* sighting that might explain its origin. I discovered that just before Tolentino's report, a new element was added to the island's social and cultural mix—something that had not existed there before and could have credibly spawned *el chupacabra* sightings. The creature Tolentino described seeing bears no resemblance to any known animal. It does, however, look almost exactly like a *fictional* creature seen by hundreds of thousands of people in 1995: Sil.

What *Species* Is *el Chupacabra*?

Sil is the name of an alien creature played by Natasha Henstridge in the sci-fi horror film *Species*. *Species* was released in Puerto Rico on July 7, 1995—just over a month before Tolentino had her sighting. The creatures look very similar; could the original *el chupacabra* eyewitness have simply described a monster she had seen in a movie? It's certainly possible; other monster eyewitnesses have described "real-life" monsters that they actually saw in films (see, for example, Loxton 2009).

I reviewed Tolentino's description and compared it to the *Species* alien, identifying over a dozen morphological similarities, including the large, oblong head; large, wraparound eye shape; black or red eyes; small or nonexistent nose; the absence of ears; the bipedal stance; long, thin arms; long, thin legs; thin, clawed fingers; small, lipless mouth; large spikes down the spine; lack of tail;

Figure 3. Texas rancher Phylis Canion displays the famous "Cuero Chupacabra" she found near her ranch in 2007. Photo by the author.

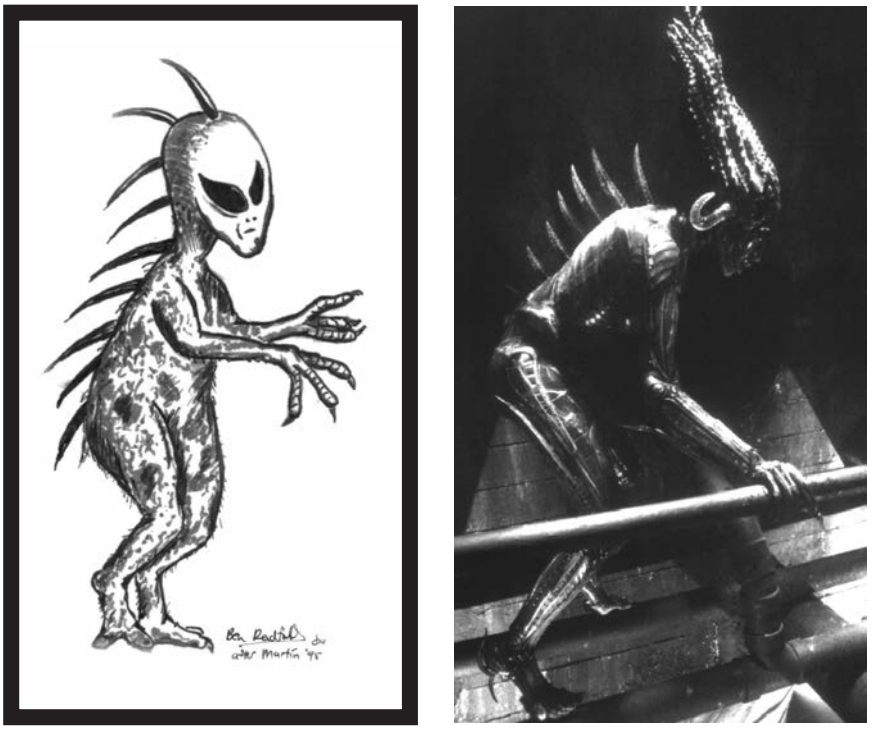

Figure 4. The original and best-known *chupacabra* image (left), based on eyewitness Madelyne Tolentino's 1995 account (drawing by the author from a sketch by Jorge Martin), bares an uncanny resemblance to the monster from the 1995 science-fiction/horror film *Species* (right).

and so on. Indeed, the resemblance of Sil to the Puerto Rican *el chupacabra* is unmistakable (see figure 4). In fact, Tolentino herself said that "the resemblance [of Sil] to the *chupacabra* was really impressive" (Corrales 1997).

Sometimes truth is stranger than fiction, and sometimes fiction influences reality. I discovered that the popular image of *el chupacabra*—the one appearing in thousands of books and magazines and on hundreds of websites as a credible eyewitness description—is in fact based on a science-fiction film. *El chupacabra*'s origin had finally been revealed.

Figure 5. The author with expert tracker Fernando Casanova searching for evidence of *el chupacabra* in Nicaragua's Indio Maiz Wildlife refuge. Photo by Chris Ayles.

Figure 6. The street in Canovanas, Puerto Rico, where Madelyne Tolentino had the first—and most detailed—*chupacabra* sighting in history. Photo by the author.

This solves one of the highest-profile "unexplained" mysteries of the past two decades. One thing in my favor was the limited scope of evidence: because the entire mystery was only about fifteen years old, the number of claims, eyewitness reports, and news accounts to consider was manageable.

The next step was completing the research and writing a book on it. (*Tracking the Chupacabra: The Vampire Beast in Fact, Fiction, and Folklore* was published in April by the University of New Mexico Press.) Of course, just because a mystery is solved doesn't mean that everyone knows about it or that many people won't think the mystery continues. The Bermuda Triangle, for example, was essentially solved decades ago by researcher Larry Kusche, yet it remains in the public's consciousness as mysterious and unexplained. The myth of *el chupacabra* will live on—though for skeptics and the open-minded public, surely this vampire has been slain. *El chupacabra* is dead; long live *el chupacabra*.

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The Numerology of 23

A Berlin biologist/physician and a psychology professor from Vienna found an increasingly inscrutable connection between the numbers twenty-three and twenty-eight. They applied their system to explanations of nearly all events in life and nature—but it doesn't quite add up.

MARK BENECKE

The number twenty-three may be well known to readers of the SKEPTICAL INQUIRER for its supposed significance, which originated with the term "23 skidoo" popularized in the early 1920s. Many uses of "23 skidoo" can be found in newspapers as early as 1906, mostly as slang meaning "it's time to leave while the getting is good." In the *Illuminatus! Trilogy*, written by Robert Shea and Robert Anton Wilson, twenty-three is the number of misfortune and destruction, as well as—of course—the alleged key to the Illuminati. Wilson describes how he came by his interest in the number from author William Burroughs, who wrote a short story in 1967 called "23 Skidoo":

> According to Burroughs, he had known a certain Captain Clark, around 1960 in Tangier, who once bragged that he had been sailing twenty-three years without an accident. That very day, Clark's ship had an accident that killed him and everybody else aboard. Furthermore, while Burroughs was thinking about this crude example of the irony of the gods that evening, a bulletin on the radio announced the crash of an airliner in Florida. The pilot was another captain Clark, and the flight was Flight 23. Burroughs began collecting odd 23s after this gruesome synchronicity, and after 1965 I also began collecting them. (Wilson 1977)

In the course of the following decades, Shea and Wilson's beautiful fairytale about the secret—and yet so openly recognizable—number lastingly embedded itself in popular culture, not only in connection with conspiracies. Among other examples,

- In the western comedy *Support Your Local Gunfighter* (1971), the hero repeatedly bets all his money on the number twenty-three. He loses until at last he actually breaks the bank, winning everything.
- In 1980, industrial/avant-garde band Throbbing Gristle recorded the song "The Old Man Smiled," which explicitly references Burroughs's "Captain Clark," "twenty-three days and twenty-three hours of the day," "Flight 23," and so forth (Throbbing Gristle 1993).
- The German movie *23* (1998) revolves around the conspiracy theories of Hagbard Celine (i.e., computer hacker Karl Koch [1965–1989]), who believed in the existence of the Illuminati in today's society, hacked for the KGB (among others), and (as the official story goes) died by burning himself to death.
- The German minimalist electronic band Welle:Erdball, which supposedly composes its music with the help of a Commodore-64 computer, devoted one of their best-known songs, "C=64/23," to the conspiracy theory connected with the number twenty-three:

> "Commodore 64, is that correct?"
> "Yes, 64."
> "If one divides this by two?"
> "It's . . . thirty-two."
> "And if one turns that around!?"
> "Then it's . . . twenty-three!" (Welle: Erdball 2000)

The significance of twenty-three can be found in all kinds of imaginative number games, but the possibilities greatly increase if one combines it with another number. I would like to introduce another dalliance with the number twenty-three, because it is an impres-

Figure 1. Original front covers of the books of Wilhelm Fliess and Hans Schlieper (Fliess 1906; Schlieper 1929).

sive example of how easy it is to become obsessed with a supposition one is fond of, in light of perplexing yet only ostensible evidence.

Older skeptics will notice immediately that the two numbers discussed below are also the basis for the pseudoscientific concept of the biorhythm—the idea that favorable, critical, and negative days in an individual's life can be predicted through calculation (Gardner 1981). The calculation of biorhythm (widespread in the 1970s but currently less prominent) employs three numbers (seen here as measured "number of days"): twenty-three for the physical rhythm, twenty-eight for the emotional rhythm, and thirty-three for the intellectual rhythm. Each rythm is said to set out on its sinusoidal course starting at birth. This assumption, however, has never been confirmed.

Rhythms of Life

The underlying idea of biorhythm is not completely fallacious. The constant repetition of the seasons, as well as many processes observed in the course of a lifetime, gives the impression that there are basic rhythms of nature in which all cycles repeat. Blossoms open and close; animals migrate and come back. Is there a master clock that conducts the life cycle? Are the small life rhythms subordinated to a greater one? Does this all-encompassing rhythm explain growth and decay?

These questions were asked at the beginning of the twentieth century by the Berlin biologist and physician Wilhelm Fliess, based on his observations of nature. Fliess then became lost in the increasingly inscrutable connections between cause and effect of his mathematically correct but wrongly applied observations (Benecke 2002; Fliess 1906). Herman Swoboda (1873–1963), a psychology professor at the University of Vienna, also claimed to have (independently) found a natural biorhythm at the same time, quite similar to Fliess's (e.g., a spontaneous repetition of thoughts after twenty-three hours and again after twenty-three days) (Swoboda 1904).

According to his own report, Fliess found initial traces of the temporal order of life in the biological fact that women usually ovulate every twenty-eight days. He noticed this during the examination of a related issue: the "typical changes in sharply defined areas of the nose, the 'genital parts of the nose,' which are located at the nasal concha and the septum," of women during menstruation (Fliess 1906).

Fliess then asked his female patients to record the exact dates of their menstrual bleeding. It became evident that the assumed standard interval of twenty-eight days almost never occurred. Because Fliess was convinced that "a pulse courses through all of life," he did not give up but was rather even more intrigued. He calculated until he found that the deviations of the twenty-eight-day standard are related to another number, which renders them explainable: twenty-three.

Now Fliess scoured medical journals and personal accounts of friends and acquaintances for temporal recurrences and rhythms, which he found could always be mathematically described in conjunction with the numbers twenty-three and twenty-eight. He claimed that each and every repetitive growth or decay process in human, animal, and plant life was deconstructable and understandable by means of the two numbers. These events ranged from intervals between the births of one particular mother's children to the times of death of family members. Fliess connected everything with his mathematical discovery: the time when plants budded or discarded their blossoms, the occurrence of hermaphroditic humans, the time at which children teethe, and even the personal histories of many generations of a family.

A brief example illustrates his method:

> On four days of the year 1815, namely on August 19th and 25th as well as on October 15th and 19th, Schubert composed an astonishing amount and his best songs. The intervals between the days result in the following:
>
> 19 August to 19 October = 61 days =
> 2 times 28 plus (28 minus 23)
> as well as
> 25 August to 15 October = 51 days =
> 2 times 28 minus (28 minus 23).
> (Fliess 1906)

Only basic arithmetic operations and two numbers are necessary to correlate days of exceptional creativity. Truly astonishing!

Fliess documented the life cycles of two amaryllis plants, which he observed for eight years, in much more detail. One of the two plants was an offshoot of the other, so the plants were genetically identical. Fliess noted the times when the plants budded, blossomed, and discarded their flowers. At first

glance, there was no correlation among the numbers. Quite elegantly, Fliess then established a link with the help of an auxiliary number, as he spelled out the following equation: "The formation of buds from one year to the next is equal to the period between blossoming in the first year and blossoming in the second year plus four times 28 minus four times 23" (Fliess 1906).

According to Fliess, even illness and death are subject to the numbers twenty-three and twenty-eight: "Of two times (23 plus 28) people who fall ill with St. Vitus' dance, 28 are men. Little Wolfgang learned how to walk after twenty-four times 28 plus (28 squared) minus two times 28 times 23 days. He lived twenty-four times 23 plus (28 squared) minus (two times 23 squared) days" (Fliess 1906).

Fliess also correctly calculated the ages of death of Goethe, Bismarck, Kaiser Wilhelm, and Alexander von Humboldt, as well as those of many other celebrities of the time by combining the numbers twenty-three and twenty-eight. How is this possible?

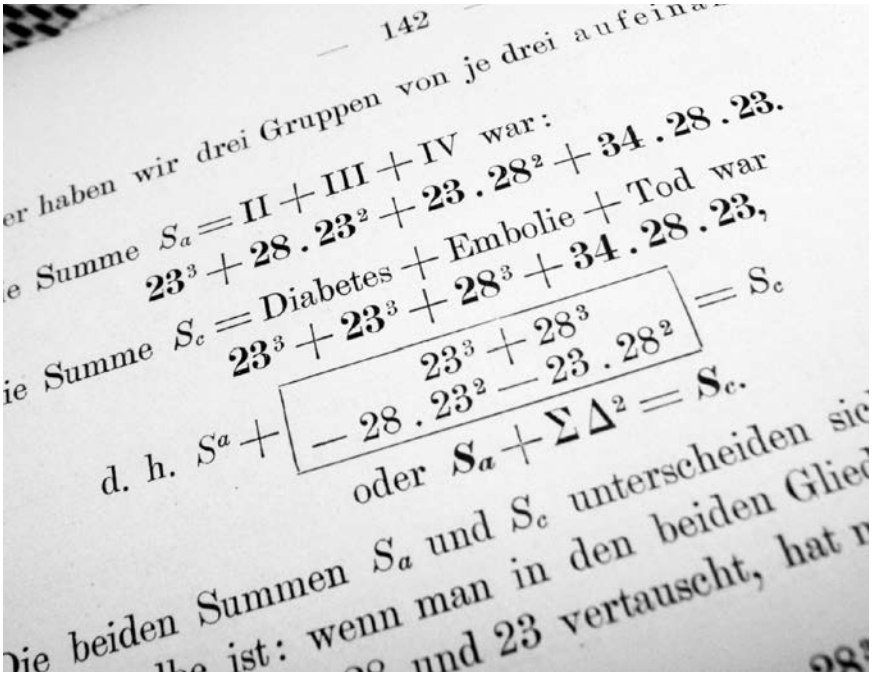
142
er haben wir drei Gruppen von je drei aufeina
e Summe $S_a = II + III + IV$ war:
$23^3 + 28 \cdot 23^2 + 23 \cdot 28^2 + 34 \cdot 28 \cdot 23.$
ie Summe S_c = Diabetes + Embolie + Tod war
$23^3 + 23^3 + 28^3 + 34 \cdot 28 \cdot 23,$
d. h. $S^a + \left| \begin{matrix} 23^3 + 28^3 \\ -28 \cdot 23^2 - 23 \cdot 28^2 \end{matrix} \right| = S_c$
oder $S_a + \Sigma \Delta^2 = S_c.$
die beiden Summen S_a und S_c unterscheiden sic
ist: wenn man in den beiden Glie
und 23 vertauscht, hat

Figure 2. Typical page from Fliess's book: A person with diabetes suffers from an embolism and dies. All events can be expressed through rhythms that are composed of the numbers twenty-three and twenty-eight (Fliess 1906, 142).

Predictions

The first indication of an error in Fliess's arduous work appears if one tries to calculate, in advance, the age at which a person will die. This calculation does not work with biorhythms and number combinations. A known death can only later be described by the two basic numbers; this is contrary to the scientific principle that one can predict future events (within the realms of the calculable) based on a "natural law." Thus, biorhythms as such cannot be a natural law, because they do not allow for predictions to be drawn from them.

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Another source of error in Fliess's work is the fact that the numbers, which Fliess had found in works of other authors, were not always correct. Contrary to the above example, three times more women than men do not fall ill with St. Vitus's dance (Huntington's disease). If Fliess was able to squeeze such false data into his system, it is very likely that all data can easily be incorporated into the biorhythm scheme.

How about calculations based on correct data, such as the budding times of flowering plants? Are these number links also calculated artificially, or do they reflect an intrinsic property of nature? The answer is that even in the "real" cases, Fliess unwittingly succumbed to his basic assumption, which he took for granted and therefore did not properly examine again (for example, by using other numbers or methods). If one examines any group of numbers, whether taken from nature or "randomly" generated according to arbitrary rules (for example, by a computer program), many of these numbers will be divisible by either twenty-three or twenty-eight and can be matched with a natural rhythm. As early as 1928, medical doctor Jakob Aebly (1885–1934) from Zürich calculated that approximately every twelfth random number is a suitable "candidate" for division by either twenty-three or twenty-eight (Aebly

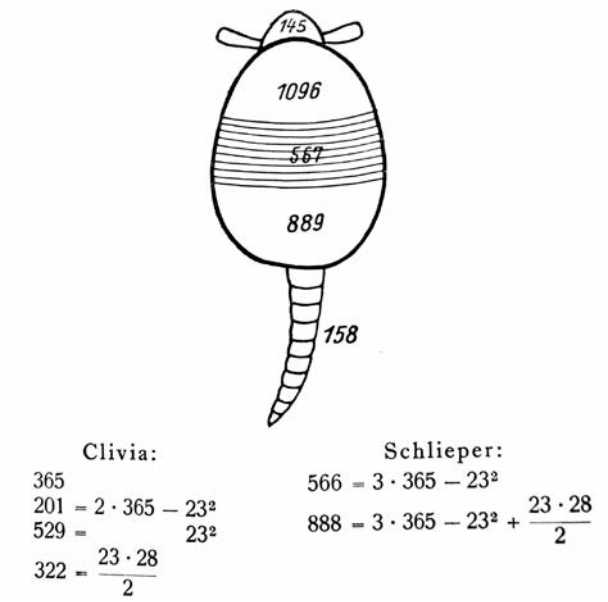


Figure 3. While examining the mosaic on the armor of an armadillo, Schlieper noticed "structures, which immediately meet the eye of the expert as infallibly true: Truly! There they were again, the intervals between the births of my own siblings, only transferred into space, represented physically!" (Schlieper 1929, 110).

1928).

Because Fliess arbitrarily considers certain numbers as belonging together (see the earlier example of Schubert's songs), he artificially increases the probability of finding numbers that fit his rhythms. It is perfect circular reasoning: Numbers belong together "because they simply belong together," so they are grouped together. The result is a rhythm that is assumed from the outset. Without it, the numbers would not have been combined and could not create a rhythm.

Armadillo and Space Year

So the rhythms derived from Fliess's numbers are artificial. No one has ever taken the trouble to recalculate the many hundreds of pages of Fliessian examples in a different manner or without using twenty-three and twenty-eight. In 1928, however, Aebly showed that many biorhythmic number games also work with a different set of numbers, for example with three and five. It nevertheless remains surprising that Fliess, with dogged determination, succeeded in creating a view of the world that appeared correct down to the last detail.

Hans Schlieper, a follower of the Fliessian periodicity theory, went even further than its creator. In 1929 he invented another value, the "space year," to manipulate along with the numbers twenty-three and twenty-eight. This value not only enabled him to mathematically recreate personal histories but also to mathematically represent the "regular" occurrence of certain dreams and the composition of living bodies:

> I frequently dream of a walk through the streets of Paris to the green of the Bois de Boulogne, and the recurrence of the image made me want to write down the dates. The first two intervals already represent half the space year with interconnection of the quadratic complex. The interval of 44 days denotes a frequently occurring circular bond ("Bindungsring"); the interval of 139 days therefore is the value of half a year, for which its form is correct. (Schlieper 1929)

While examining the mosaic on the armor of an armadillo, Schlieper noticed "structures, which immediately meet the eye of the expert as infallibly true: Truly! There they were again, the intervals between the births of my own siblings, only transferred into space, represented physically!" (Schlieper 1929).

Schlieper did not conceal that the wish was father to the thought in this case. From his point of view, however, his conclusions seemed to merely reflect his scientific curiosity, not his possible blindness to a false assumption:

> I never had doubts that, someday, one would be able to make visible the period values, and especially the space year, using living beings. In some cases, this rather unscientific wishful thinking bore rich fruit, for example in the event of Louis Pasteur's first experiments regarding a rabies vaccination. He held tenaciously to his theory and asserted himself against the entire world. The periodicity theory, however, failed due to its circular thought. (Schlieper 1929)

Rows, Roundels, and Rhythms

Unintentionally, natural science magazines like the German *Bild der Wissenschaft*—which annually honors the best mathematical approaches to "calculating" the current year solely with the help of the four numbers of which the year is made—provide elegant proof against the periodicity theory. Readers connect the four numbers of the year through simple mathematical methods and calculate the respective year by playing surprising games with numbers. If you look for it long enough, there will always be a meaning. But no one embraces the idea that the four digits of the year in question must have magical or rhythmic properties, just because you can manipulate them mathematically to arrive at that respective year.

In short, a mathematically inclined (and knowledgeable) person can connect almost all numerical values to a rhythmic sequence, using similarly simple calculations with some constant basic numbers; or, they can simply transform and invent the sequence if necessary. Whether the figures are "true" or "false" (i.e., whether they are obtained randomly or through observation) is not important. Connections can always be made, although with some combinations of numbers this is easier than with others. This strategy is even simpler given the right amount of creativity for explaining exceptions to

the rule by means of "circular bonds" and "excessive units," which Schlieper invented to allow his calculations to work properly.

Conclusion

The obituary that Hans Schlieper wrote for his teacher Wilhelm Fliess reads as follows:

Wilhelm Fliess, born 24 October 1858, died shortly before his 70th birthday. For him too the year drew the line, the leap year, which had become a scientific experience for him through the births of his children:

His son Robert, born 29 December 1895 1
1461 = 4 J

His son Conrad, born 29 December 1899
8 10515 = 32J - 51 × 23

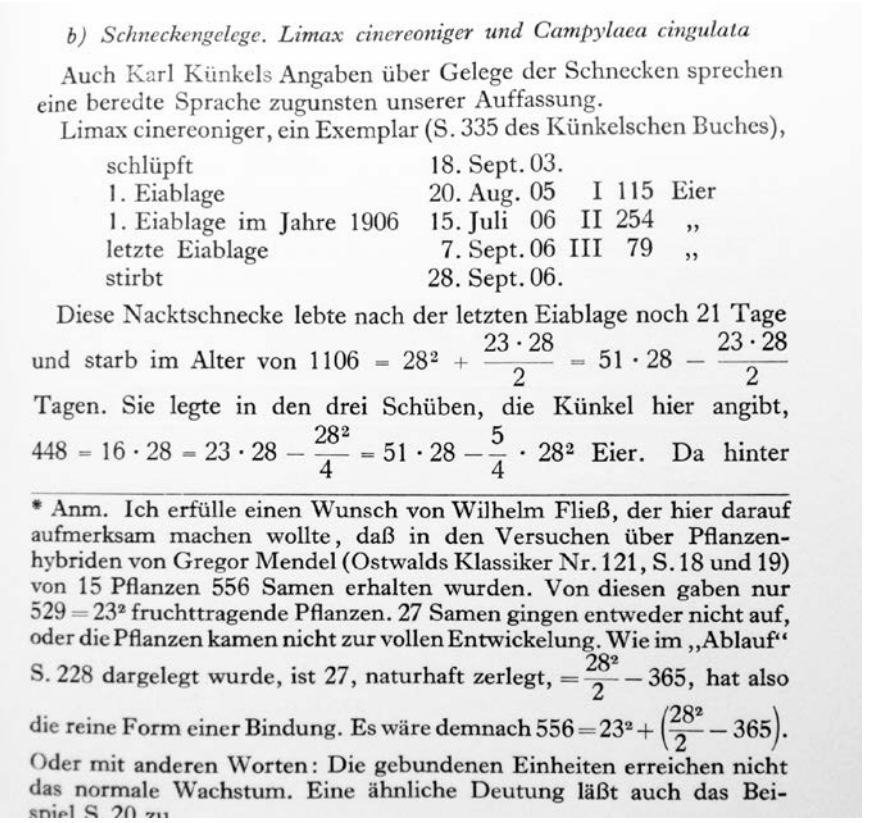
Wilhelm Fliess, died 13 October 1928

The values $1173 = 51 \times 23 = 28 \times 23 + 23^2$ and $1428 = 51 \times 28 = 23 \times 28 + 28^2$ are typical connection values. (Schlieper 1929)

Reflecting on the dogged determination with which Fliess and Schlieper approached their subject, we might smile at this tragicomic swan song. But Fliess would have probably considered this epitaph appropriate.

Interest in the Fliessian doctrine of biorhythms, which at first glance appears to be built on a solid mathematical and empirical foundation, vanished mainly because it worked only in retrospect: Everything can be linked together, but only after the fact; these connections are not predictable.

Nevertheless, these deliberations, which only much later became known as biorhythms, contain a grain of truth: obviously there are other biological regularities, such as circadian rhythms (e.g., Smith 1970; Hastings et al. 2003). Yet no one should prematurely laugh about the works of Fliess and Schlieper, even if they are inaccurate. Even today it is often tricky—and unfortunately also tempting—for natural scientists and psychologists to draw strict conclusions about life and death from mathematical relationships. This is particularly true if the data sample—intentionally or unintentionally—is small or has been preselected based on erroneous presuppositions. ■



b) Schneckengelege. Limax cinereoniger und Campylaea cingulata

Auch Karl Künkels Angaben über Gelege der Schnecken sprechen eine beredte Sprache zugunsten unserer Auffassung.

Limax cinereoniger, ein Exemplar (S. 335 des Künkelschen Buches),

schlüpft	18. Sept. 03.			
1. Eiablage	20. Aug. 05	I	115	Eier
1. Eiablage im Jahre 1906	15. Juli 06	II	254	„
letzte Eiablage	7. Sept. 06	III	79	„
stirbt	28. Sept. 06.			

Diese Nacktschnecke lebte nach der letzten Eiablage noch 21 Tage und starb im Alter von $1106 = 28^2 + \frac{23 \cdot 28}{2} = 51 \cdot 28 - \frac{23 \cdot 28}{2}$ Tagen. Sie legte in den drei Schüben, die Künkel hier angibt, $448 = 16 \cdot 28 = 23 \cdot 28 - \frac{28^2}{4} = 51 \cdot 28 - \frac{5}{4} \cdot 28^2$ Eier. Da hinter

* Anm. Ich erfülle einen Wunsch von Wilhelm Fließ, der hier darauf aufmerksam machen wollte, daß in den Versuchen über Pflanzenhybriden von Gregor Mendel (Ostwalds Klassiker Nr. 121, S. 18 und 19) von 15 Pflanzen 556 Samen erhalten wurden. Von diesen gaben nur $529 = 23^2$ fruchttragende Pflanzen. 27 Samen gingen entweder nicht auf, oder die Pflanzen kamen nicht zur vollen Entwickelung. Wie im „Ablauf" S. 228 dargelegt wurde, ist 27, naturhaft zerlegt, $= \frac{28^2}{2} - 365$, hat also die reine Form einer Bindung. Es wäre demnach $556 = 23^2 + \left(\frac{28^2}{2} - 365\right)$. Oder mit anderen Worten: Die gebundenen Einheiten erreichen nicht das normale Wachstum. Eine ähnliche Deutung läßt auch das Beispiel S. 20 zu

Figure 4. Development of a Limax snail, following an "independent" observation that Schlieper took from a book on snails. The footnote goes further, referring to Gregor Mendel's (founder of classical genetics) original observations: "Out of 15 plants, Mendel got 556 seeds. From those however only 529 [which equals] 232 did grow fruits. 27 seeds did not develop fully or at all, i.e., 282 / 2 −365 which is a pure bond" (Schlieper 1929, 309).

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Three Types of Evidence Lacking for Paranormal Claims

JONATHAN C. SMITH

Theory is a part of the never-ending debate on the paranormal. Must paranormal claims be held suspect in the absence of credible underlying theory?

Paranormal researchers protest that throughout history, observations have emerged for which we have no explanation. They often cite the contagious spread of disease, gravity, and stellar combustion—all observations that were once not grounded in accepted theory. Critics reply that indeed science is fueled by mysterious observations without explanation—anomalies that require a paradigm shift. However, typically these instances are dramatic and repeatedly observed. There is no dispute that people get sick, apples fall, and the sun shines. In contrast, positive paranormal findings are very weak, at the very edge of significance, and not reliably replicated. Believers reply that a paranormal effect may be very fleeting and subtle, a pattern also not unknown in traditional science. Consider the faint evidence for exotic subatomic particles, black holes, or claims that an extinct soft-shelled turtle still lives. If we can tolerate decades of research on these topics, surely we can wait for evidence to finally emerge for extrasensory perception. A skeptic might note that there is a difference between tolerance and paradigm revolution.

There is something interesting about this line of discussion. It quickly morphs into claims about observation and evidence. Indeed, perhaps this is where our focus should be directed.

A theory is more than an explanation; it is also a summary of observations concerning an observed phenomenon. On close examination, three types of evidence are involved:

1) *Specific theory-based observations* concerning a concrete claim that is directly a part of a theory.
2) *Implied observations* not specifically predicted by a theory but nonetheless consistent with its basic assumptions; that is, they are necessary for the observations to work or permitted by the observations if they are indeed fact. Implied observations are often not directly mentioned by researchers. However, they are assumed.
3) *Basic world-view observations* concern the grounding view of the world required if the theory in question is valid. Once again, such observations are often assumed without much note.

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If we wish to make a strong claim about the nature of reality, the full spectrum of evidence must be considered.

To illustrate, the theory of evolution states that species evolve through natural selection. The theory itself makes a number of direct hypotheses, supported through observation. For example, one should, and can, find "missing link" fossils for species hypothesized to have evolved from each other (fish, walking fish, crawling land creatures). The genetic makeup of closely related species should be similar (humans and chimpanzees share up to 98 percent of their chromosomes). Birds confined to islands on which the primary source of food is nuts are more likely to develop tough nut-cracking beaks, rather than pointed beaks good for fishing for worms.

Furthermore, the theory of evolution, if examined in detail, implies a number of other ancillary hypotheses outside the direct domain of evolution. For example, if evolution works, we can hypothesize that the actual living form and age of an organism can be determined from its fossil remains; the genetic makeup of an organism determines the organism's form and structure; and tough, sharp, and hard mouthparts are good for cracking open sources of food (nuts, bones, dried meat). To the extent observations support these ancillary hypotheses, they also must be added to the underlying fabric of observational support for evolutionary theory.

Finally, the theory of evolution is based on a causal and materialistic view of the world. Natural selection works because objects can move, interact, and cause movement among other objects. The physics of fulcrum mechanics permits small amounts of jaw force to crack tough shells. Such evidence for deep underlying theory can be added to our observational matrix.

So, a scientist who claims that through natural selection fish evolved into lizards eventually would have to claim that fossils reveal the form and age of ancient creatures, that the gene structures of fish and lizards determine their living structures, and that the laws of cause and effect rule—as opposed to the caprices of a currently popular deity.

Both believing and skeptical researchers would likely agree that we should accept a paranormal claim supported by observational evidence. This includes all the evidence; we can't cherry-pick a tempting anecdotal report or unreplicated finding of minimal significance. All honest researchers, including those of the paranormal, must use the complete scorecard and consider direct evidence of a paranormal claim, ancillary evidence, and observations of basic worldview ideas and assumptions.

As readers of the SKEPTICAL INQUIRER recall, psychologist Daryl Bem has claimed evidence that university students can see into the future or that future events can retroactively affect their choices (see James Alcock's "Back from the Future: Parapsychology and the Bem Affair" in the March/April 2011 issue of SI). As extensively reported, Bem's claim is very weakly supported by our first type of observation. However, ancillary evidence is also lacking. State budgets should be in crisis because of a horde of lottery winners. At least a few slot machines should retroactively signal their spin to gleeful gamblers. Fewer voyeurs should be subject to arrest. Sales of pornography should drop. Finally, if Bem has found something true about the universe, the laws of physics need not apply to all parts of our immediate world. It would be a gross trivialization of Bem's work to assume that a precognitive peep-show should be the only manifestation of a catastrophic rift in the space-time continuum. At the very least, I would hope for some quantum evidence of the gods of ancient Greece or the Flying Spaghetti Monster (for an alternative argument, see venganza.org and Google "God speaks! The Pastafarian Quatrains").

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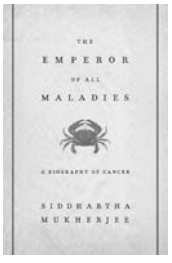
In summary, a serious consideration of how theories work is not an abstract academic exercise. Such effort directs our attention to the types of observational evidence required for a credible paranormal claim. ■

Two Views of the War on Cancer

HARRIET HALL

Pink Ribbon Blues: How Breast Cancer Culture Undermines Women's Health
By Gayle Sulik. Oxford University Press, New York, 2010.
ISBN: 0199740453. 424 pp. Hardcover, $29.95.



The Emperor of All Maladies: A Biography of Cancer
By Siddhartha Mukherjee. Scribner, New York, 2010.
ISBN: 978-1-4391-0795-9. 571 pp. Hardcover, $30.

The pink ribbon is a widely recognized symbol of the war on breast cancer. Pink-ribbon culture has turned breast cancer into a consumer item: you can buy branded products or wear the brand logo. You can laugh for the cure, buy shoes for the cure, even test drive a BMW for the cure. You can feel good about yourself because you think you are supporting efforts that will end breast cancer. The reality is more complex, as Gayle Sulik explains in her new book, *Pink Ribbon Blues: How Breast Cancer Culture Undermines Women's Health*.

Pink-ribbon culture has been instrumental in raising awareness of breast cancer, making it acceptable to talk about it and providing support to victims; but it's not all good. The culture exaggerates the benefits of mammography, supports an industry that makes huge profits, and promotes an image of the "shero" survivor that doesn't fit the experience of many women.

"Mammography saves lives," the slogan goes. Yes, but far fewer than most people believe. For every 2,000 women who are screened for ten years, ten will be treated unnecessarily and only one will have her life prolonged. The concept of *carcinoma in situ* is being reevaluated: it is not really cancer but only a risk factor for subsequent development of cancer. Many women have undergone surgery and chemotherapy for a lesion that would never have caused them any harm. And the radiation from mammography has the potential to *cause* a few other cancers.

Mixed metaphors about "war" and "femininity" have re-framed our thinking about the fight against breast cancer. Women have been made to feel guilty for not conforming to pink-ribbon ideals of heroism and optimism. The tyranny of pink-ribbon culture has usurped the voices of many diagnosed women who don't conform to its stereotypes. Perhaps because the benefits of mammography screening have been exaggerated, research into possible environmental causes of cancer has lagged. Corporations have arguably benefited more than patients; they are making big bucks from mammography equipment, pharmaceuticals, and other products. Women's issues and consumerism cloud clear thinking.

Sulik says that "fighting the good fight" has taken precedence over winning the war. She questions the value of a pink-ribbon culture that limits how we talk and think about breast cancer; disempowers, demeans, and objectifies women; and engages in fear-mongering that leads to overdiagnosis and overtreatment. She suggests taking a road less pink and rethinking our approach to research on effective prevention and treatment.

These issues are worth thinking about, but Sulik's book is repetitive and takes an interminable 379 pages to deliver its message. I was bored and had to force myself to finish reading it. Sulik concentrates on social issues, but I thought her understanding of the science behind cancer research and treatment was incomplete and her expectations for a victory in the war against cancer were simplistic and unrealistic.

* * *

While I was reading Sulik's book, I happened upon a book that is far more worthwhile and better written: *The Emperor of All Maladies: A Biography of Cancer* by Siddhartha Mukherjee, a cancer physician and researcher. It is a history of cancer that explains how science gradually came to understand some of cancer's realities, reveals cutting-edge knowledge, and discusses exciting new directions in

research. It is also a riveting read with a plot like a detective story and entertaining vignettes about the successes and failures, and personalities, of the people involved—including scientists, doctors, activists, and patients.

For example, Mukherjee's book tells of how America's foremost surgeon developed the radical mastectomy operation based on a misconception of cancer biology. Unfortunately, it had no chance of helping women whose cancer had already started to metastasize, and it unnecessarily mutilated those whose cancer was localized and could have been treated just as effectively with a lumpectomy. One early chemotherapy researcher found a permanent cure for one type of cancer, choriocarcinoma, and was rewarded by being fired. One researcher's procrastination and poor housekeeping led to a serendipitous discovery on culture plates that he hadn't gotten around to discarding: it turned out the virus he was looking for grew far more slowly than he had imagined.

It is also a riveting read with a plot like a detective story and entertaining vignettes about the successes and failures, and personalities, of the people involved.

Early scientific gropings gradually bore fruit. Today we know that cancer is not one disease but a collection of diseases characterized by uncontrolled cell growth. We know it is produced by a series of mutations and by changes in the expression of genes. We know its abnormalities are only exaggerations of normal processes essential to our welfare. We understand what processes have gone astray in the cancer cell. We are sequencing cancer genes just as we have sequenced the human genome, and instead of treatments that damage normal cells while destroying cancer cells, we are developing targeted treatments that interfere with the biological processes of individual cancer strains with little or no harm to normal cells.

Gleevec is a stunning example. It targets a specific enzyme that is overactive in chronic myelogenous leukemia (CML). Before Gleevec, patients with CML were told that they had a fatal disease that would kill half of them within three to six years and that the only available treatment had devastating side effects; today, CML patients can be told they have a chronic disease that will not shorten their life span as long as they take a pill for the rest of their lives.

Some mutations are caused by carcinogens in the environment: we can hope to minimize or prevent these. Other mutations arise from random copying errors during the normal process of cell division: these may be an unpreventable fact of life. We may have to redefine what constitutes victory in the war against cancer. Instead of eliminating the beast, we may succeed in de-fanging it—turning it into a tame chronic disease that can be controlled with medication.

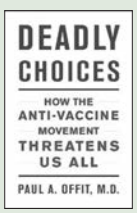
Although *Pink Ribbon Blues* has a limited message that may be of particular interest to sociologists and feminists, most readers will find *The Emperor of all Maladies* a far more profitable and enjoyable use of their time. ■

Harriet Hall, MD, (the SkepDoc) is a retired physician who writes on medical topics and on pseudoscience and questionable medical practices. She is a weekly contributor to the *Science-Based Medicine* blog and is a SKEPTICAL INQUIRER contributing editor.

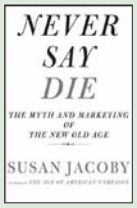
Listing does not preclude future review.

CRITICAL THINKING: The Antidote for Faith. Wayne R. Bartz. River's Bend Press, Stillwater, Minnesota, 2011. Softcover, $19.95. The author, a retired clinical psychologist and psychology professor, offers this lively and highly readable book to encourage and celebrate critical thinking and provide some tips to sharpen that skill. Bartz strongly endorses the skeptical exploration of accepted belief and suggests having a sense of humor about it. He may be right that his book "will help you feel good about being a skeptic and should generate even more doubts, questions, and, I trust, a few horselaughs." Chapters deal with such topics as "Must you 'respect' other people's beliefs?"; "psychics, seers, and other silly persons"; critical thinking as the amiable skeptic's toolbox; religious gurus who demand your money; and religious zealots who demand your life.

DEADLY CHOICES: How the Anti-Vaccine Movement Threatens Us All. Paul A. Offit, MD. Basic Books, New York, 2011. 270 pp. Hardcover, $27.50. Paul Offit, chief of infectious diseases and director of the Vaccine Education Center at the Children's Hospital of Philadelphia, has been at the forefront of doctors' battle against the anti-vaccination movement. He sees the movement as a war against science. The victims are children, now increasingly susceptible to infectious diseases, some deadly, that could otherwise be eliminated. The fear of vaccines, the choice to act on that fear, the consequences of that choice, and the voices rising in protest are his subject. Offit's book is more than just a vigorous defense of vaccines and a rebuttal of arguments against them. It's a reminder of the power of scientific knowledge and the harm we risk, as a society, if we give that up.



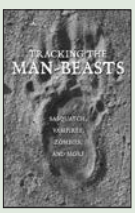
NEVER SAY DIE: The Myth and Marketing of the New Old Age. Susan Jacoby. Pantheon Books, New York, 2011. 352 pp. Hardcover, $27.95. The author of *The Age of American Unreason* and *Freethinkers* here focuses her considerable analytical and literary talents on the marketing of the idea that



there is a new kind of old age that is experienced in a radically different way from the old age of previous generations. She hopes this book about the "genuine battles of growing old" will appeal to those who draw more support from reality than from "platitudes" about defying old age. Pharmaceutical companies, lifestyle gurus, and scientific businessmen who suggest that there will soon be a "cure" for the "disease" of aging are among her targets.

THE SCIENCE AND HUMANISM OF STEPHEN JAY GOULD. Richard York and Brett Clark. Monthly Review Press, New York, 2011. 223 pp. Softcover, $16.95. A welcome new analysis of the contributions to both science and humanistic values of the late evolutionary biologist and writer Stephen Jay Gould. As the authors, both sociologists, point out, Gould's intellectual legacy will take many years to assess. But theirs is a good early step. As they say, Gould's "remarkable success as a scholar and public intellectual was due not only to his lucid thought and keen insights about nature, but also to his masterful prose and unmatched erudition." Part One deals with his contributions to evolutionary theory and the history of life, Part Two to science and humanity. The latter section begins with a valuable chapter, "Debunking as a Positive Science." Gould emphasized that we can learn a great deal in studying about where scholars go wrong and that debunking can therefore improve our understanding of the world, including ourselves.

TRACKING THE MAN-BEASTS: Sasquatch, Vampires, Zombies, and More. Joe Nickell. Prometheus Books, Amherst, New York, 2011. Softcover, $19. Joe Nickell is *the* master solver of major popular mysteries, and here he directs his formidable investigative and literary talents to a topic that endlessly fascinates us all—manlike monsters more or less imagined in our own image. He divides his topic of supposed monstrous beings lurking at the very fringes of science into five sections: 'Monster' Men, Hairy Man-Beasts, The Supernaturals, Extraterrestrials, and Manimals. No one does such investigations better than Nickell, and he is to be congratulated for another superb effort in bringing clear thinking and strong evidence to bear on questions usually swamped in speculation and wishful thinking.



—Kendrick Frazier

Fresh Voice, Passionate Polemic

RYAN SEALS

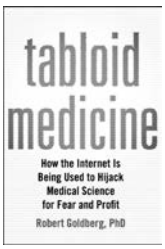
Science has always existed in uneasy alliance with general society. Like any meritocratic elite, scientists stand apart, admired and misunderstood in equal degrees.

Perhaps this is unsurprising. Scientists and physicians, after all, are the products of intense selection—into undergraduate institutions, graduate or medical schools, further postgraduate training, and fiercely competitive academic positions. We expect these individuals to possess expert and arcane knowledge: knowledge that, by definition, the typical individual does not have. When it comes to medicine, we trust these individuals to keep us healthy and to treat us when we're sick. Perhaps a little friction now and then is inevitable.

Though medicine commands a great deal of respect—the majority of Americans hold scientists and medical doctors in "high regard" (at 70 percent and 69 percent, respectively) according to a 2009 Pew poll—there remains a recalcitrant minority, by whom we are all held hostage, that is opposed to scientific progress. This small, vocal minority that distrusts organized medicine and sees conspiracies in every laboratory has been prominent for decades and is increasingly able to affect our lives—whether through vaccination waivers, opposition to drug development, or panic over consumer products.

Author Robert Goldberg finds a cause of, or at least an accelerant for, these tendencies in the Internet and in our "insta-" information culture. In *Tabloid Medicine: How the Internet is Being Used to Hijack Medical Science for Fear and Profit*, Goldberg discusses topics ranging from psychology to sociology in his search for a coherent theory of why we seem to be growing more distrustful of experts and why organized medicine and public health—despite their historical pedestal—are increasingly being viewed as just another voice in the marketplace of health information.

Goldberg is at his best when reviewing the histories of health scandals: Vioxx and cardiovascular disease, the



Tabloid Medicine: How the Internet Is Being Used to Hijack Medical Science for Fear and Profit
By Robert Goldberg, PhD. Kaplan Publishing, New York, 2010. ISBN: 1607147270. 336 pp. Hardcover, $25.99.

Though medicine commands a great deal of respect… there remains a recalcitrant minority, by whom we are all held hostage, that is opposed to scientific progress.

measles-mumps-rubella (MMR) vaccine and autism, and selective serotonin reuptake inhibitors (SSRIs) and suicide. To damning effect, Goldberg documents the fraud and misinformation that led from the work of an errant scientist to a cultural phenomenon to a public relations disaster, culminating in public-health consequences. He voices an eloquent defense of the drugs, doctors, and patients wronged in these instances.

The result is a passionate polemic against everything wrong with the media's coverage of health issues. But amid the sound and fury, Goldberg tends to overreach, committing some of the same fallacies he decries in others and betraying a cursory understanding of some of the major concepts in evidence-based medicine. He wields the public-opinion poll like a scalpel, displaying his roots in public advocacy, but his writing on research methodology seems stiff and didactic, as if he is trying to convince his readers of the merits of valid science on the basis of authority.

Goldberg falls prey to what we might call the "methodological fallacy," impugning a study by virtue not of its scientific content but of its research methodology (a tendency one sees often among anti-vaccine advocates). Goldberg is right to point out, for example, the many pitfalls in meta-analytic techniques, but a recitation of methodological limitations does not a scientific argument make. Meta-analysis is a widely accepted component of evidence-based medicine that is used to summarize multiple studies. Goldberg twice cites John Ioannidis, MD, PhD, for his work on improving clinical trials, while omitting the facts that Ioannidis has done more than any other researcher in recent years to point out the potential biases in individual studies and that Ioannidis is a proponent of meta-analytic techniques.

However, Goldberg is right to emphasize the pernicious effects of the precautionary principle—the idea that "any industrial activity or technological advancement carries hidden and uncertain risks that must be determined before introducing or allowing it into the environment." A favorite ploy of obstructionists of all stripes is to demand "more science" and "better science" long after a substantial amount of creditable research has been done. Science and medicine can never be 100 percent safe; hypothetical risks can be concocted ad infinitum, ensuring a never-ending carousel of pseudoscientific accusation and scientific refutation.

[Goldberg] wields the public-opinion poll like a scalpel, displaying his roots in public advocacy, but his writing on research methodology seems stiff and didactic, as if he is trying to convince his readers of the merits of valid science on the basis of authority.

But Goldberg is perhaps most controversial in his discussion of industry funding and conflict of interest. Prior to his work at the Center for Medicine in the Public Interest, Goldberg was affiliated with the libertarian Manhattan Institute, and it shows. Goldberg is unabashedly pro-industry, and he argues that the risks presented by industry-academia collaboration are no greater than the potential biases emanating from other sources that researchers face every day.

Goldberg has an uncanny ability to find bias where it supports his argument but fails repeatedly to subject his own arguments to the same level of scrutiny. If we are so susceptible to unconscious biases, as he convincingly argues in his early chapters, why aren't medical researchers equally at risk? Industry collaboration is certainly needed for a vibrant and productive scientific community, but isn't some concern over industry influence warranted? Goldberg displays none.

In fact we may understand other of Goldberg's arguments through his prior affiliation with libertarian causes—he is, at heart, a methodological individualist, finding answers to complex social issues in individual behaviors. He begins and ends his book with discussions of how individuals, with their myriad innate heuristic biases, make irrational decisions. His advocacy of personalized medicine centers more on patient choice than medical efficacy. Personalized medicine has the potential to revolutionize health in tremendous ways, yet Goldberg seems only to be relieved that it conforms so nicely to his individualistic ideology.

For a book so concerned with the biases of others, one finds a disturbing lack of humility in *Tabloid Medicine*. A great deal of medical and public-health decision making rests at the penumbra of current knowledge; Goldberg too often conveys the advocate's zeal for unwarranted clarity. The recognition of bias is a two-way street, and Goldberg would do well to turn his penetrating gaze on some of his own arguments.

Overall, Goldberg's voice is unique and passionate; his book is a welcome addition to the growing literature on anti-science irrationality. Goldberg's emphasis on patient choice may appeal to individuals previously alienated in this debate. Let's hope this discussion moves us toward a more fruitful discussion of medicine and the public good—and the role of evidence in both. ■

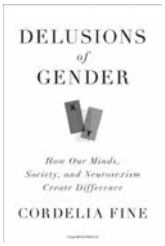
Ryan Seals is a doctoral student in epidemiology at the Harvard School of Public Health. He can be reached at rseals@hsph.harvard.edu.

The Problem with Neurosexism

MASSIMO PIGLIUCCI

Nowadays it is commonly accepted knowledge that there are profound innate differences between genders. I'm not talking about the obvious anatomical ones but about the allegedly (radically) different ways in which male and female brains work. We routinely hear statements to the effect that people of gender XX or XY are better at, more capable of, or more attracted to a litany of tasks and behaviors—from spatial abilities to mathematics, from aptitude for science to liking the color pink. When prominent figures—like former Harvard President Larry Summers—get in trouble for talking about behavioral gender differences as if they were established facts that are backed by the power of neuro- and evolutionary biology, a chorus of defenders rises up to decry political correctness and present the Summerses of the day as valiant fighters for rationality in the face of relativism and demagoguery.

Not so fast, says Cordelia Fine in her *Delusions of Gender: How Our Minds, Society, and Neurosexism Create Difference*. Fine is an academic psychologist and freelance writer whose book ought to be kept beside the likes of Steven Pinker's (antithetical) *The Blank Slate* to provide a bit of balance to what has become common and yet largely unfounded "knowledge" about gender differences. Let us be clear at the outset that nobody is seriously suggesting that genetics and evolution have nothing to do with human behavior, including gendered differences. Rather, Fine's claim is that a lot is being taken as established fact these days on the basis of much-too-flimsy evidence—and, more importantly, that the widening consensus among scientists and the general public about the innateness (and consequent inevitability) of gender differences has a measurable and pernicious effect on women.



Delusions of Gender: How Our Minds, Society, and Neurosexism Create Difference
By Cordelia Fine.
W.W. Norton, New York,
2010. ISBN: 0393068382. 338 pp.
Hardcover, $25.95.

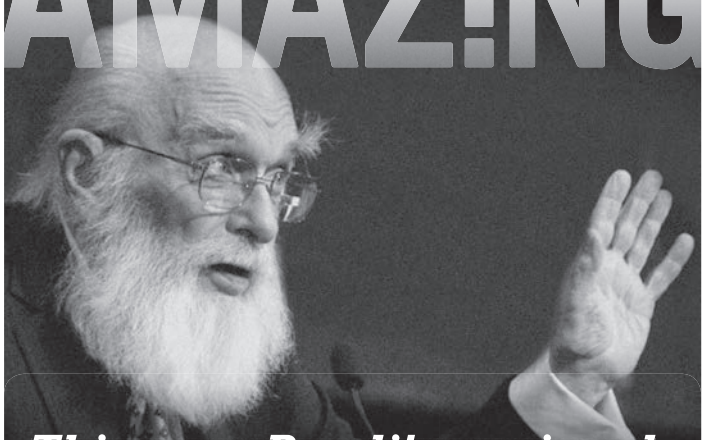
One of the most convincing pieces of counter-evidence Fine brings up is the series of studies showing how social context subtly but dramatically alters people's performances on aptitude tests. Put young women taking a math test in a room in which they are surrounded mostly by males, and they will not do as well as the average male. Change the environment to a more gender-neutral one, and the same group of women will now perform just as well as the men. This is because, as several researchers quoted by Fine argue, human beings are extremely attuned to social context, and we adapt to social expectations very quickly—and largely subconsciously.

What psychologists call *priming* also has a major effect because it is capable of erasing whatever "well-known" differences there seem to be between genders. Read a story to women about to take an aptitude test. If the story mirrors common gender stereotypes, the test takers will do measurably worse than if the story characterizes women as equally as good as men at whatever task is being considered.

"But," the skeptics will say, "what about all the literature showing that gender differences are measurable even in very young babies? Don't young girls 'naturally' play with dolls while boys prefer fire trucks? Don't toddlers tend to look more at faces if they are female and at mobile toys if they are males?" Superficially, yes, but it takes only a little bit of digging and some clever experimental manipulation to again show that these effects are the result of young boys' and girls' tendency to quickly pick up and conform to expected gender roles that are not-so-subtly imposed by their environment (not just parents but, more importantly, peers and school teachers). As for the toddlers, a major experiment allegedly showing innate differences turned out to be seriously flawed because it was conducted in a way in which the experimenter could easily influence the result (i.e., there was no double blinding). When repeated with proper protocols, most of these studies showed little if any difference between genders.

Nature and nurture surely interact in complex ways, particularly in an animal as behaviorally flexible as a human being. But the danger of "neurosexism" (and evolutionary sexism) is that public pronouncements by scientists far outpace the evidence, with the result of reinforcing stereotypes and negatively affecting millions of lives. Scientists have an ethical duty, as Wittgenstein put it in another context, to remember that whereof one cannot speak thereof one must be silent. ■

AMAZ!NG



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A '9/11 Truth' Letter-Writing Campaign to SI

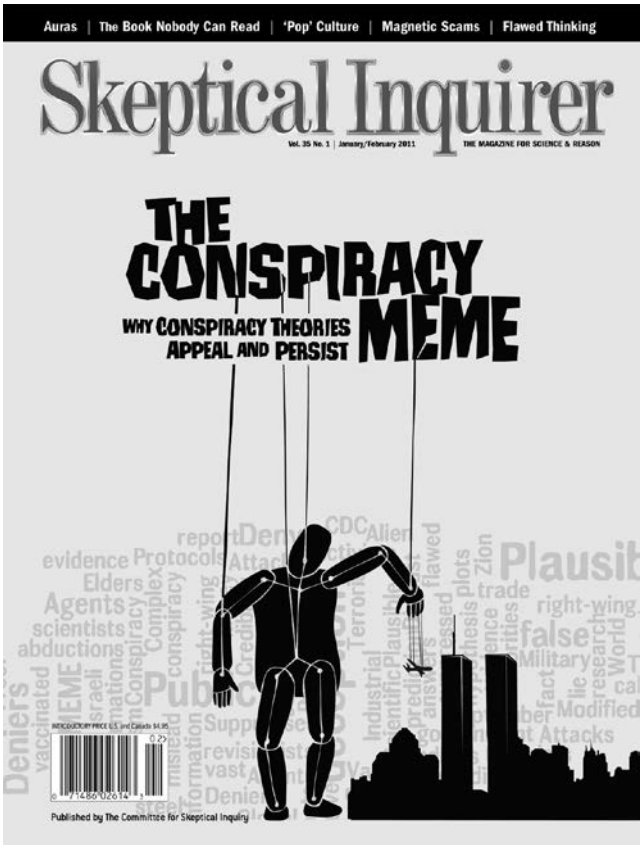
An interesting phenomenon began the evening of January 7, 2011, almost a month after the publication of our January/February 2011 issue with its cover article "The Conspiracy Meme: Why Conspiracy Theories Appeal and Persist" by sociologist Ted Goertzel.

At 6:41 PM ET, a column titled "Skeptical Inquirer Attacks 9/11 Truth Movement, Avoids Vast Body of Scientific Evidence" was posted on the website of Architects and Engineers for 9/11 Truth. The column was a critical response to Goertzel's article. It lauded SI's "noble mission" of criticizing pseudoscience and claims of the paranormal but said in this case we'd gotten it wrong. It claimed Goertzel's article had ignored a "vast body of evidence" that demonstrated "the controlled demolition of all three World Trade Center skyscrapers on 9/11." As criticism, its tone was not unreasonable. It ended with a call for a letter-writing campaign of "polite" letters to me as editor.

At 7:01 I received the first letter via e-mail. It was not polite. It referred to the web column. It called for seizure of SI's assets and asserted that "Jews—not Arabs—did 9/11." Other letters rapidly followed. By noon of the next day, eleven letters had arrived; over the ensuing weeks the total would exceed thirty. Some were fairly reasonable and polite, others were not. All expressed disappointment in our article. Yet few if any provided any indication that the writer was an SI reader or had even read our article. The first clue was that these complaints came so quickly after the web posting and we hadn't heard complaints like these about Goertzel's article before that, even though the issue had been out for a month. The second was that none of the letter writers engaged substantively with any aspect of the article or showed they understood that it dealt with the processes of conspiratorial thinking ("why conspiracy theories appeal and persist," as we stated on the cover) about a number of different scientific topics; 9/11 was just one of the many examples discussed. Most of the writers simply asserted 9/11 truthers' views that the World Trade Center collapse had to have been accomplished by planted explosives. An example of these letters, selected nearly randomly from the thirty-plus received, is Dan Noel's on page 63.

One exception to such shortcomings was a letter (actually two versions of different lengths) from professional engineer Wayne H. Coste. His letters dealt with several aspects of what Goertzel actually wrote and resulted in several somewhat constructive interactions between the two of them. We publish the shorter version on page 63. Goertzel responds at the end.

—KENDRICK FRAZIER, Editor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Skeptical Inquirer
Vol. 35 No. 1 | January/February 2011
THE MAGAZINE FOR SCIENCE & REASON
THE CONSPIRACY MEME
WHY CONSPIRACY THEORIES APPEAL AND PERSIST
Published by The Committee for Skeptical Inquiry

Conspiracy Thinking

Thanks for the meme-based analysis of conspiracy theories ("The Conspiracy Meme: Why Conspiracy Theories Appeal and Persist," SI, January/February 2011). One supposes that our minds, adept at pattern finding, use disparate data either unintentionally or intentionally to grow the meme. It may even be that memes are easily spread inside a given cultural universe or cultural mind. One supposes the SKEPTICAL INQUIRER and its cultural universe also has memes buried in it. I am reminded of a Tom Clancy novel, *Rainbow 6*, in which a hostage is astounded that his life might be forfeited due to his captors' mistaken belief that he possesses some crucial data.

It may be that we have to live with memes and their impact because aggregation and ordering are what we do. We have a fight-or-flight mechanism that informs our memes.

One scary outcome may be that when a culture becomes very homogeneous, any minor variation from the cultural norm will be seen in the light of such memes and will be ruthlessly stamped out. Perhaps that is what happened in twentieth-century Russia, China, and Germany when paranoid leaders and a terrified public coexisted: the meme of orthodox belief collided with real worlds, and everything became unsafe.

As a conservative Christian, I thank you for your publication. Although we obviously disagree on basic assumptions about our universe, the search for truth via skeptical inquiry is something we have in common.

John Van Egmond,
Egmond Associates Ltd.
Georgetown, Ontario,
Canada

Ted Goertzel mischaracterized the content of the e-mails stolen from climate scientists in

his otherwise excellent article on conspiracy theories.

The e-mails don't indicate whether or not scientists ever pressured editors about the publication of a paper on climate. For context, the journal the scientists were e-mailing about, *Climate Research*, saw half its board resign in protest because a rogue editor was publishing suspect climate papers without appropriate peer review.

Goertzel cites an article from the American Enterprise Institute's Steven Hayward. While Hayward's article is less strident than most misinformation circulated about in the e-mails, it refers to scientists as "a cabal" and passes on long-discredited criticisms of climate research. It was odd to see this piece cited in an article about conspiracy theories.

I don't think Goertzel did a fair job of describing the study of past climates. The statistical methods underlying the original "hockey stick" papers have been widely politicized, and I fear that so much misinformation has been produced about those papers that it is hard for most people to discern truth from fiction.

But that misinformation has consequences: Attorney General Ken Cuccinelli of Virginia is suing the University of Virginia because he wants the documents from one of the original hockey-stick researchers. Politicians harassing scientists like that is just one price of a society rife with conspiracy theories.

Aaron Huertas
Press Secretary
Union of Concerned Scientists
Washington, D.C.

As a registered professional engineer committed to the scientific method, I would like to echo Ted Goertzel's support for the peer-review process. Goertzel says, "review panels must have full access to all datasets. . . . It is especially important that . . . qualified specialists [have] an opportunity to present alternative views. . . ."

Engineers who observe the destruction of WTC7 as possible only by controlled demolition have been stifled by the National Institute of Standards and Technology's (NIST) decision to suppress details of their WTC7 failure models. For example, NIST replied: "Indeed the NIST Director has determined that the release of 3,370 files from the [failure] analysis results . . . might jeopardize public safety, and therefore, these files have been withheld." Suppressing this analysis from peer review is unconscionable. Public safety is endangered when engineers are precluded from studying how an ordinary office fire could completely and utterly destroy a forty-seven-story modern skyscraper such that for more that 100 feet it exhibited free-fall acceleration.

Goertzel notes, "technological conspiracies often . . . [make] bizarre claims that . . . [information is] suppressed." In this case, it is not a bizarre claim but rather a bizarre reality. We welcome Goertzel's, and SKEPTICAL INQUIRER's, public call for NIST to release its suppressed analysis.

Wayne H. Coste, P.E.
Petition Signer
Architects and Engineers for 9/11 Truth

The cover of the January/February 2011 SKEPTICAL INQUIRER is excellent. The drawing and the conspiracy theory formula suit very well what is arguably the grandest contemporary conspiracy: 9/11. Alas, the article itself gets 9/11 all wrong, peremptorily implying that the official "Osama's fanatics brought down the Twin Towers with their hijacked jets" theory would be an irrefutable fact. This casts an ominous shadow on the whole article as well as the value of the SKEPTICAL INQUIRER's contributions in the field of parapsychology, where evidence is much more subtle than in the case of the Twin Towers.

I strongly encourage you to include in your next edition a solid article on the official 9/11 conspiracy theory, with a section on the amply demonstrated controlled demolition of the Twin Towers. Anything less will establish the respectable SKEPTICAL INQUIRER as another agent in 9/11 censorship and an accomplice in the fear, the wars, the economic meltdown, and the neglect of pressing worldwide problems that the 9/11 hysteria has generated.

Dan Noel
Costa Mesa, California

Goertzel states, "Opposition rooted in religious or ideological concerns is acceptable as part of the democratic political process, but it need not prevent scientists from reaching a consensus when one is justified" (p. 37). I would like the author to clarify his meaning.

My readings of James Madison, including his *Memorial and Remonstrance against Religious Assessments* and his statement, "Religion and government will both exist in greater purity, the less they are mixed together," make clear to me that the author of the Constitution did not intend to include religious concerns as an acceptable part of the democratic process in the United States of America. There are still a few million of us citizens who think that religion has no part to play in the political process of our government.

Likewise, John Adams's whole term in office was essentially a debate over whether ideological concerns should be the basis of our government, including the concept of political parties. This was not concluded, nor has it been concluded since then. We have parties, and we have ideological debates (culture wars). I may be the only one, but I think that ideology is, and has been, a problem counterproductive to freedom and liberty. It may be a part of the political debate, but in the end it is useful only as a means of placing power in the hands of those who espouse the ideology. Ideology is apart from reality. It may be in part based on reality but has to be taken on faith.

W.C. "Rusty" Lyon
lyonaramburo@gmail.com

Ted Goertzel replies:

Memes are everywhere, as John van Egmond observes. They can be dangerous when they become fixed ideas, impervious to evidence and argument. Believers in conspiracies are more like lawyers or activists than scientists. They eagerly collect evidence to support their cause, ignoring or discounting any that conflicts with it. Wayne Coste and his fellow "truthers" are an example. Coste demands a peer-reviewed study of one set of files, implying that if they were released they would support his thesis. He makes no mention of the extensive evidence already available that does not support it. He calls the suppression of these files "bizarre," dismissing concerns that they contain information that could be of use to terrorists. This argument might not be true but it is plausible, not bizarre. What is bizarre is the theory that explosives were secretly planted in the building in such a way as to cause a controlled demolition. That would have involved dozens if not hundreds of people pulling out walls and disrupting everyday activities, with no one detecting them or giving them away.

Peer review takes place at scholarly journals where the peers are experts in a field. Readers who are serious about peer-reviewed research on 9/11 could plough through Bazant and Verdure's "Mechanics of Progressive Collapse: Learning from World Trade Center and Building Demolitions," in the March 2007 Journal of Engineering Mechanics. *Bazant and Verdure conclude that the criteria for a*

progressive collapse were met in the World Trade Center case with a margin of error of several orders of magnitude. If this paper is too technical, as it will be for anyone without a background in engineering mechanics, I recommend a readable paper by Brent Blanchard, "A Critical Analysis of the Collapse of the WTC Towers," which is easily found online. Blanchard is in the business of the controlled demolition of large buildings, and his company had instruments in place in New York at the time of the attack. He also happens to be my next-door neighbor, so I can vouch for his integrity.

Dan Noel asks the SKEPTICAL INQUIRER *to publish an issue on 9/11, although the existing literature covers it extensively. There are many good references at the Wikipedia site on 9/11 conspiracy theories. An article on the "truthers" movement would be of interest, but the* SKEPTICAL INQUIRER *is not the place for peer-reviewed technical research on engineering mechanics.*

There is an abundance of peer-reviewed research on climate change in scientific journals, so the conspiracy theorists are reduced to arguing that the peer review process itself is a conspiracy. Virginia Attorney General Cuccinelli's campaign against the climate scientists at the University of Virginia is looking foolish even to many of his fellow conservatives. But the climate scientists' public relations and communications skills have not matched their statistical legerdemain. Global-warming predictions necessarily depend on complex statistical simulations that are very difficult to understand and evaluate, and a little more humility and respect for the honest concerns of others would go a long way. Aaron Huertas's reference to a "rogue editor" raises a red flag in my mind. There can be honest disagreements about what kind of peer review is "appropriate," but can there really be a "rogue editor"? Wasn't the editor selected by the publisher or editorial board? Similarly, the curt dismissal of Steven Hayward, a serious and thoughtful writer, is unconvincing.

Scientists sometimes act as if their expertise entitles them to dismiss the concerns of people who do not share their faith in the scientific method. I share Rusty Lyon's strong preference for a secular political system, but that doesn't give me the right to tell other people what basis they can use for their judgments. We certainly don't want anything like the Soviet system, in which the government claimed to have "scientific" truth and suppressed anyone who disagreed, any more than we want to be ruled by a theocracy. Conspiracy theories are tools used by people with closed minds. We need to reject them even when they are used by people on our side of an issue.

The Voynich Manuscript

I enjoyed the analysis of the Voynich manuscript by Klaus Schmeh in the January/February 2011 issue ("The Voynich Manuscript: The Book Nobody Can Read"). I was interested in the comparison to the works of Adolf Wolfli, a diagnosed schizophrenic who lived and died in Bern, Switzerland. A book by his psychiatrist Dr. Walter Morgenthaler, *Madness and Art*, outlines many of this strange man's works that are very similar to the Voynich manuscript.

The unusual and cryptic writing and illustrations are very alike in many ways. Both emphasize a musical compositional idea, women in odd situations, and many illustrations along with text. Wolfli's work was prolific with *thousands* of pages, many large, produced over thirty-five years in an institution.

I believe that the Voynich manuscript is the work of an unnamed and unknown schizophrenic, as I believe the Book of Revelation by John of Patmos was also the hallucinations of a paranoid schizophrenic with his emphasis on repeated numbers of sevens, sixes, etc. A recent book by Daniel Smith titled *Muses, Madmen, and Prophets* discusses the effects of auditory hallucinations on many of founders of religions until the more scientific age saw most of these as disturbances of the mind rather then visitations by "God." I have worked with many homeless and mentally ill patients and find their writings and drawings to be very bizarre and highly detailed cryptic works, even when they present as rather contained and appear "normal."

David L. Thompson
DaveFossil@aol.com

It was only briefly that I had an opportunity some years ago to see some pages of the botanical section of the Voynich manuscript, but what struck me, a farmer and nurseryman, were illustrations clearly showing grafting techniques for plant propagation—not a common skill.

Surely the illustration on page 47 is a sunflower and the plants on page 49 are equally familiar. The left one, in full bloom, and the right are the same with only the seed pod (poppy?) remaining.

The broad range of subjects seems to indicate an author who was highly intelligent and educated who may have suffered, perhaps later in life, from a degenerative mental disease and whose writing was to him (or her) perfectly clear.

R.G. Huber
Branchville, New Jersey

Could the Voynich manuscript be some sort of musical notation? Has anyone analyzed it from that perspective? Repetitions and large-scale patterns seem consistent with music.

R. Allen Gilliam
Winter Park, Florida

As a physician my strong impression is that the Voynich manuscript is a treatise on reproductive biology.

William C Harvey, MD
Dallas, Texas

Klaus Schmeh replies:

Thompson's schizophrenia theory is indeed interesting, and it is one I have discussed with Joe Nickell and others at the European Skeptic Congress. One argument against it is the fact that the Voynich manuscript was written on animal skin—an expensive material in the fifteenth century and certainly not something that was generally given to a mentally ill person. But this is only an indication, not a hard fact.

I have never heard Gilliam's hypothesis put forth before, but it might be worth examining. One interesting question is why anybody would write music in such an encrypted way and illustrate it with strange pictures.

The naked women are clearly an argument in favor of Harvey's hypothesis. But what about the (nonidentifiable) plants, the star patterns, and the other illustrations? It would be interesting to see if they could have a relation to reproductive biology, too.

Kudos for 'Hope: Faith, Atheism, and Agnosticism'

Having been an avid subscriber to SKEPTICAL INQUIRER for over thirty years, I am deeply moved to report that "Hope: Faith, Atheism, and Agnosticism" by Jonathan C. Smith (in the January/February 2011 issue) has to be among the best five articles I've ever read. Never before, anywhere, have I seen this age-old "division of the minds" so clearly dissected and delineated. It certainly helped me understand, with crystal clarity, how our normal human affinity to "believe" can be an accepted adjunct to a skeptic's toolbox.

Thank you, Jonathan—and SKEPTICAL INQUIRER!

Phil Kennedy
Wethersfield, Connecticut

Kudos for publishing Jonathan C. Smith's article. Any article that makes reference to the

Church of the Flying Spaghetti Monster is a superior article indeed. Those who may wish to learn more about his noodly goodness (especially if you are partial to beer and pirates)—and perhaps in becoming a Pastafarian—should check out the Church's website at www.veganza.org.

Pat Russell
pat.russell@comcast.net

Professor Jonathan Smith ends his article with the question "Can one be an atheist, of any kind, and live a spiritual life?" He answers his own question with a resounding "Of course." What on earth is he talking about? And what is a "spiritual journey?"

These statements nullify much of the foregoing content and call for a completely new article on the concept of spirituality.

Jim Cranwell
Whitby
Ontario, Canada

Jonathan C. Smith replies:

To Phil Kennedy: Thanks. A spaghettigram of your name is appropriately "Eh! Kindly Pen!"

To Pat Russell: You must be congratulated for consistently sending this exact note to whatever journal publishes work in which I mention His Holiness, the FSM. Indeed, a Spaghettigram of your name is "Assert! Pull!" Seriously, I recommend that the curious read Henderson's classic "The Gospel of the Flying Spaghetti Monster" and Jon Smith's heretical "GOD SPEAKS! The Pastafarian Quatrains." Pat, may you be touched by His Noodly Appendage!

To Jim Cranwell: You need to know that many (including Jim Harris) who call themselves "New Atheists" also refer to themselves as "Spiritual Atheists." Some are secular Buddhists or even secular Christians. We reject childish and primitive superstition, yet find meaning in what fills us with awe, mystery, and reverence. For more on what spiritual atheism entails, you may venture into my recent book Relaxation, Meditation and Mindfulness: Second Edition *(www.lulu.com/stress). If* Skeptical Inquirer *agrees, I may attempt an article in these pages.*

Seeing Auras

Thank you for your excellent article "The Aura" (SI, January/February 2011). I have been seeing auras for about ten years. Auras, in my case, are not the result of psychic phenomena but are the result of chromatic aberration in my glasses. On bright sunny days the skyscrapers downtown (and sometimes people, in exactly the right lighting conditions) have either blue or red auras. The aura is a very fine line surrounding the edge of the object.

It only appears in certain lighting conditions and, I think, is only apparent if the object is light. Dark objects don't show an aura.

It makes me wonder if at least some reports of auras are some kind of natural chromatic aberration in the lens or other clear tissues of the eye.

Gary Hughes-Fenchel
gghf@comcast.net

Optimism and 'The Right Stuff'

I am writing in response to Steven Doloff's criticism of optimism ("The Right Stuff," SI, January/February 2011) for two reasons. First, to ask what Doloff means by "success." Second, and more important, is that the idea that one can predict success is at odds with the engine of evolution. It is akin to adaptationism. We can take advantage of opportunities as they arise as long as we are open to them and don't limit ourselves to what we can anticipate. We can narrowly view Doloff's reasoning in terms of probabilities, but it's more important to look at success in terms of how systems evolve whether biological or not.

While I share Doloff's concern about magical thinking, we must not confuse naiveté with confidence in one's ability to take advantage of opportunities. Doloff has a student who is both Hispanic and a Marine, yet he only considers the student's odds of success as a Hispanic. Why not consider the greater odds of a Marine succeeding? The "door" that the student is looking for is opportunity.

While some optimism is foolish and even reckless (especially when we seek nostrums rather than medical treatment), it can be pessimism that is foolish in failing to anticipate that which cannot be anticipated.

It would be most foolish to accept despair and lock ourselves into permanent recession.

Bob Frankston
http://frankston.com

Interview with a UFOlogist

With regards to the intriguing interview with UFOlogist Kevin Randle (SI, January/February 2011): Isn't he just a bit perplexed by UFO crashes? Surely it seems odd that alien spacecraft, of remarkable design and based on technologies that enable them to travel astonishing distances at near (or beyond?) light speeds, just "give it up" and crash in the quiet skies of our planet—not just once but several times. Just a thought. . . .

Arthur S. Reber, PhD
Broeklundian Professor of Psychology, Emeritus
Brooklyn College and the Graduate Center of CUNY

[FOR THE RECORD

Ed Whitfield is a Republican congressman from Kentucky, not Tennessee, as mistakenly stated in John Mashey's "Strange Problems in the Wegman Report" (SI, March/April 2011).

We apologize to readers and the author for somehow missing a character in our retype of the title of Klaus Schmeh's article "The Voynich Manuscript" (SI, January/February 2011).

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as e-mail text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to Letter to the Editor, 944 Deer Dr. NE, Albuquerque, NM 87122, or fax it to 505-828-2080.

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March/April 2011 Hidden Messages
Puzzle Contest Winner: **Barry Zimmerman**.

Amateur Astrologer Discovers New Constellation

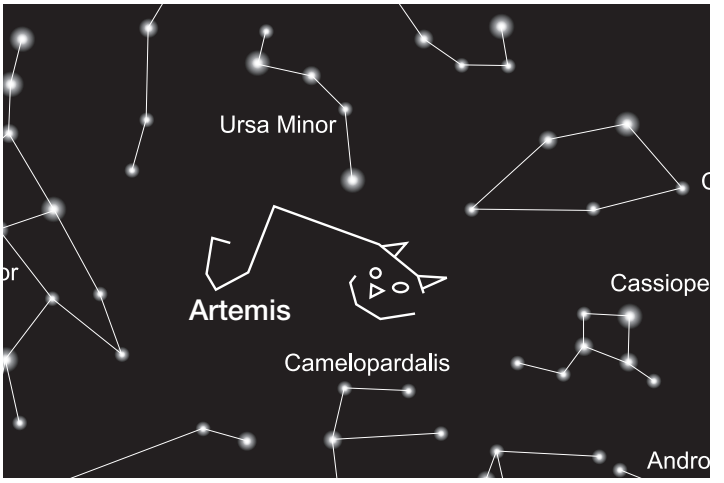
by J. Goodbody

The discovery of a new constellation in the night sky has created an upheaval within the astrological community, bringing notoriety to Rockford-area palm reader Debbie Williams.

Unable to determine the ultimate fate of a client during an astrology reading, Williams found that the sign Aries no longer seemed to provide her with any sense of celestial foretelling.

"I always had trouble making out Aries," said Williams, who admits needing to tilt her head in a certain way and squint with one eye in order to see the constellation known as "The Ram."

According to Williams, Aries is just too small to be considered a constellation and thus can't reasonably have any real effect on 1/12th of the entire human population. This new revelation left Williams relieved to know that her own difficulties in assigning vague advice to desperate people were not her fault.



Using her pareidoliascope, Williams was able to observe Aries in a new light.

"I was thrilled to realize that my recent failures weren't because of the impossibility to predict future events and personality traits based upon the positions of the planets, the sun and the moon in relation to stars that are trillions of miles away," Williams said. "It must be because this particular constellation is flawed."

Seizing an opportunity, Williams first relegated the tiny Aries to merely a dwarf constellation, or constelloid, removing it of its influence over human events.

She then began to construct her own constellation by assigning the stars that once made up Aries and borrowing some others from nearby Pisces. Williams observed that the new cluster of stars looks a lot like her cat, Artemis, and so named the discovery after her dear pet. She is hopeful that her new constellation Artemis will take its rightful place in the daily horoscope.

Astrology is still recovering from the recent controversy brought on by astronomer Parke Kunkle, who pointed out that your sign might very well be wrong anyway because of precession of the equinoxes. His competing claim is that a thirteenth constellation called Ophiuchus should be included in the zodiac calendar. This has left millions concerned and angry that their lives may have been guided in the wrong direction over all these years.

But most astrologers reject Kunkle's claims, convinced that the science of astronomy, and the methodological naturalism it uses to derive facts from detailed observation and reliable mathematical models, can't say anything about who should marry whom or what lottery numbers they should play.

"You're right, we can't do that," said each and every astronomer reached for comment. "That's not the point."

If Williams' discovery withstands the rigorous process of peer review—which within the astrological community means that her peers launch a letter writing campaign and press releases to change public sentiment—she may be the first astrologer in millennia to actually change the Zodiac itself.

Since the announcement, hundreds of psychic mediums and astrologers have come forth claiming to have predicted the shakeup. Williams says, now that she thinks about it, her own psychic told her that "big things were going to happen in her personal or professional life, having something to do with the outdoors."

"She gave me that reading so long ago, I almost forgot about it, but she sure was spot on," Williams said. "I mean what could be more 'outdoors' than the universe, right?"

Using an instrument called a pareidoliascope, astrologers are able to perceive otherwise nonexistent patterns created by stars strewn apart by hundreds of light years. These readings of the constellations can be hugely influential with people because of psychological phenomena such as confirmation bias, apophenia (the tendency to see patterns in otherwise meaningless data) and subjective validation. In fact, Americans spend billions of dollars per year seeking advice on major life decisions.

The astrological community is in full debate over how this new constellation will influence the employment opportunities, stock market trends, and the love lives of over half a billion people across the world.

In recent years, part-timers seem to be playing a larger role in the field of astrology. According to Dr. Roger Flemming, a professor at the University of Chicago's Astrology and Astrotherapy Department, it is not uncommon for amateur astrologers to happen upon discoveries that significantly contribute to pseudoscience.

Professional astrologers complain that government and university-supported astrologers are too underfunded and overwhelmed to keep track of the influence of all the celestial bodies.

"It's great that we have part-time prognosticators contributing to the field of astrology and filling in the gaps," Flemming said. "You don't have to be some Zodiacal professor to help people give up personal responsibility for the things that happen in their lives."

J. Goodbody frequently has thoughts in his head that make him smile. Were they expressed at the moment they poof into existence without some form of structured outlet such as satire, these same thoughts would cause significant distress among his friends, family, and coworkers. This is why he writes for *The Chicago Dope*, a satirical online newspaper, from which this article is reprinted with permission.

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The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst NY 14226-0703.

International affiliated organizations listed at www.csicop.org

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